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IBM Unveils 'New' Computer, NCR Adds to Line

Century 300 Offers Huge Core Memory

By Frank Piasta
CW Staff Writer

DAYTON, Ohio – NCR has announced a new 300 system for the Century series that gives users internal speeds five times faster than were available on the Century 200. The 300 system, the third and largest in the NCR Century line, includes a new magnetic core memory that replaces the thin film rod memory previously used on most Century systems.

Also announced by NCR were two peripheral devices, the 650 drum storage unit and a controller to increase the capabilities of the recently announced 657 disk drive.

More powerful internally than the IBM 360/50, according to NCR, the 300 is designed to provide users with large-scale processing capabilities and better price/performance ratio than older models of the series.

The internal speed of the 300 compares favorably with that of the RCA 6, and the IBM 370/145. The availability of large quantities of core storage makes it seem likely that users will utilize the multiprogramming operating system that will be available with the hardware.

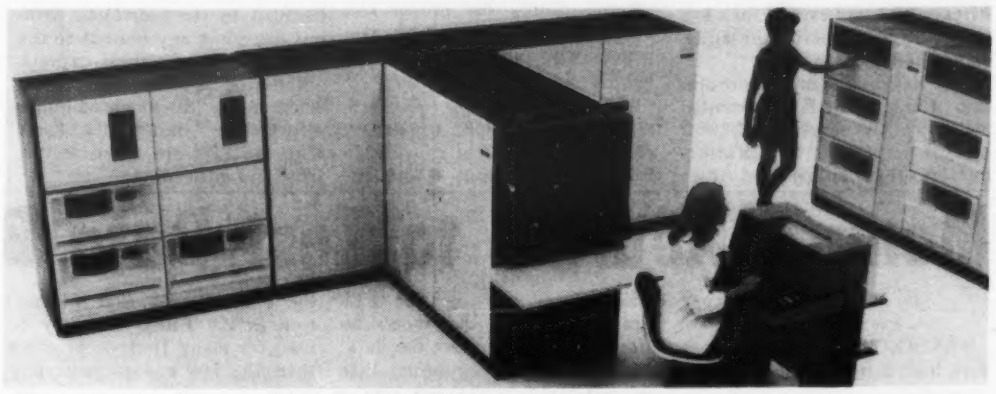
A comparison based on memory sizes makes the NCR the equal of the largest of the new RCA and IBM systems, and four times as large as the 370/145.

At the lower end of the range, the 300 is priced below the RCA 6 and the IBM 370/145. At the upper end, the price of the 2-Mbyte Century is high compared to the RCA 6.

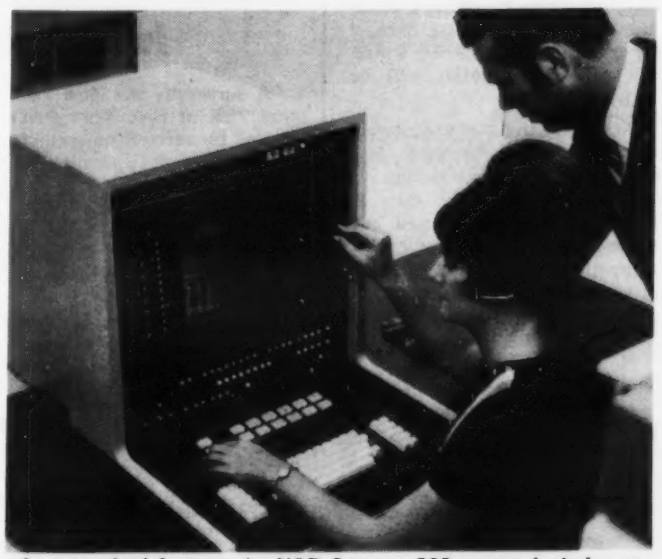
NCR may be trying to concentrate its efforts in small machines where the bulk of its potential new users will be found, as well as offering upgrade capability for Century users.

With a basic memory of 128K bytes, the 300 is expandable to 2,048K bytes. Cycle time of the system is 650 nsec for a four-byte access. The 300 maintains compatibility with both the 100 and 200 models of the series while incorporating design innovations that are suited to meet the throughput requirements of larger applications.

(Continued on Page 6)



The engineering design model of the IBM 370/145 features IBM's first use of semiconductor memory. The new IBM 2319 disk storage (upper left) attaches to the 370/145 central processor eliminating the need for a separate control unit.



As a standard feature, the NCR Century 300 system includes an integrated CRT console for fast operator/system communication in a multiprogramming environment. The display unit facilitates review of programs, job queues, peripheral status and other operational data.

370/145 Uses MIC Memory, Native Disk

By Frank Piasta
CW Staff Writer

WHITE PLAINS, N.Y. – IBM last week unveiled a system that might be the first completely new computer in the current wave of announced new systems.

The 370/145, intended for the medium-scale user, is said by IBM to have internal operating speeds up to five times those of the 360/40 and 11 times those of the 360/30.

The 145 is the first computer by a major manufacturer to use a semiconductor main memory. Called monolithic integrated circuitry (MIC) by IBM, the technology previously has been used in the memory buffers in the largest 360s and in the larger 370s.

Another innovation in the 145 is the incorporation of a reloadable control storage (RCS) to augment main memory.

Similar to the writable control storage on the 370/165, the RCS is used to store code for the system's instruction set, including all system control functions. These instructions will be supplied to the user on a prewritten cartridge by IBM.

Also included on the cartridge will be instructions for such optional functions as emulators. The standard 32K characters of control storage can be expanded to 64K by using a portion of main memory.

Direct Attachment

The 370/145 user will be able to attach IBM 2314, or compatible, disk drives directly on the CPU without the cost of a separate disk control unit. On a three-drive configuration, this could mean a savings to the user

(Continued on Page 6)

Pacific Telephone Sued for Erroneous Billing

By Phyllis Huggins
CW West Coast Bureau

BEVERLY HILLS, Calif. – Computerized billing has become the target of consumer wrath in a $7 million suit filed in Los Angeles against the Pacific Telephone Co.

Richard Hodge of the Beverly Hills law firm of Hodge and Martin is the aggrieved party. His suit states that he received a telephone bill with numerous charges for calls that he had not made, and when he repeatedly complained to the telephone company he was told that "all billing was done by computer, that there could be no mistake on its part, and that Hodge must pay or have his telephone service disconnected."

The next month's bill was received and it too contained calls that Hodge had not made. Again he protested, but again was told that the "computers made no errors and that Hodge did, in fact, place the telephone calls so billed."

The following month the telephone company reversed its position and acknowledged that it had mistakenly billed numbers to his telephone from another customer and that he was entitled to credit for those calls.

Hodge assured the telephone company that all bills would be promptly paid when correctly computed. About six days later Hodge's service was cut off.

For all this, the lawyer says he has suffered "great emotional distress and trauma and further, great embarrassment and humiliation experienced with his family, clients, office employees, and fellow members of the legal profession."

In addition to personal damages, the $7 million suit is partly a class action suit filed on behalf of all Pacific Telephone Co. subscribers who may have been overcharged as a result of "inaccurate computer operations."

The complaint states that plaintiffs allege that the total amount to be paid to subscribers due to erroneous computer billing exceeds the sum of $1 million.

A Pacific Telephone Co. spokesman said that he believes that the error was the result of keypunching the wrong information for a new subscriber which resulted in his calls being assigned to Hodge's number. This would eliminate the class action aspects of the suit and limit it solely to the lawyer's personal grievances.

GE Promises Its T/S Users Faster Access to Network

NEW YORK – General Electric, through its Information Services Division, has told users that it is still very much in the time-sharing services business.

By consolidating its existing services through three central processing sites, GE says users will get faster, more reliable, though not necessarily cheaper access to GE information processing network facilities.

As part of the network expansion, GE said it has been experimentally transmitting computer data from the U.S. to London via ComSat satellite. However, European data lengths for users are not yet finalized.

The integrated network operations planned for 1971 include the linking of three "super centers" which will channel computer data from user sites to a central GE 635.

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On the Inside

FBI to Computerize Rap File; No Safeguards Planned

By Joseph Hanlon
CW Staff Writer

WASHINGTON, D.C. – The FBI will computerize its national criminal history file, but will trust to the honesty of policemen to prevent misuse of this data. No software or hardware safeguards will be used.

Included in the file are persons who were arrested and acquitted.

Any policeman will be able to check the arrest record of any American. Nothing except professional ethics will prevent policemen from looking up the criminal histories or rap sheets of their neighbors or local or national politicians.

"What is to prevent a local deputy sheriff somewhere from selling this information to insurance agents and private investigators?" asked one critic.

19 Million Files

The FBI currently maintains a manual file of 19 million rap sheets. A rap sheet contains all of a person's arrests and convictions, anywhere in the country. Arrests are listed even if they led to acquittal, a practice presently being challenged in court.

The National Crime Information Center (NCIC) currently maintains rap sheets on 60,000 wanted persons, as well as information on stolen cars and other property. Over 3,000 police departments have real-time access to this file via Teletype.

Special Agent Donald R. Roderick, who is responsible for systems design implementation for NCIC, recently announced that the FBI hopes to begin adding rap sheets from the manual file of 19 million to the NCIC computer next summer.

But he also announced that no increased security procedures would be introduced.

Responsibility for proper use of this data "rests with the person who operates the terminal," he declared.

When a terminal user requests a rap sheet, the NCIC computers respond automatically, without further verification. Rapid response is important because the police sometimes use the system to check whether a person is dangerous before actually apprehending him.

Wanted persons have far more serious problems than invasion of privacy, so most experts feel that the lax security is a reasonable trade for quick access.

But in the case of rap sheets of people who are not wanted, the right to privacy becomes important, and the rapid and widespread dissemination can be harmful to the individual without providing any benefit to the FBI, according to these experts.

Roderick sees no danger because this is "documented police information." But critics charge that the files are often incomplete and misleading.

For example, a person may have been arrested as part of a civil rights protest in the South. This arrest may appear in the FBI files under the guise of a much more serious charge, such as sedition. Furthermore, the law may have been declared unconstitutional, but that fact will not appear in the file.

Finally, arrests which did not lead to conviction are frequently held against a person, even though he has officially been declared innocent.

NCIC has been operating since January 1967. Currently it uses three computers: two 360/50s and one 360/40. A 360/65 is on order.

NCIC is now tied directly to 31 local and state law enforcement computer networks.

Menard Hearing to Test Data Bank Policy

By Joseph Hanlon
CW Staff Writer

WASHINGTON, D.C. – Does a man have a right not to be "data banked"?

Or does the Federal Government have the right to collect in computer data banks true information about a citizen, even if the person has done no wrong and such information will be harmful to him?

These questions will probably be answered, as the result of a U.S. Court of Appeals ruling.

In the specific case, Dale B. Menard, who was arrested and then released without being charged, and who has no other arrest record, is attempting to purge his arrest record from the FBI files.

The District Court refused to hear the case, but the Court of Appeals ordered the District Court to provide a hearing. The case probably will not come before the District Court until next year.

Potential Harm

The Appeals Court ruling gives the case wide implications. The court noted that arrest records can be very harmful [see box] and said that the primary problem was to balance the need for the information by the FBI against the harm that would be done by disseminating the data.

The court further noted that even if Menard could not get the record purged, he might have the right to limit who could see it.

In effect, the Appeals Court said that the traditional government policy of "collect the data you need, and then give it to anyone else with a 'need to know'" is not adequate, and must be replaced by a policy that considers the harm to be done by dissemination of data.

Banks See FBI Files

"Particularly troublesome is the possibility . . . that information in the FBI's files may be used for many [purposes] other than the law enforcement purposes for which its retention may be justified," wrote Chief Judge David L. Bazelon.

He noted that by statute an FBI record may be given to "authorized officials of the Federal Government, the states, [and] cities." But under regulations issued by the attorney general, he continued, the "list of authorized recipients includes governmental agencies in general, most banks, insurance companies, and railroad police."

"It may even be that this information would be released to the press were [Menard] subsequently charged with a crime," he declared, because the attorney general's regulations permit the release to the press of "background information" regarding defendants.

FBI 'Only a Repository'

The FBI views its files as "only a repository" for information submitted by states, according to an FBI spokesman. It accepts what the states send, and if a state asks for an arrest card to be returned, it complies, the judge said.

But policies vary from state to state and even from city to city. In Los Angeles, where the Menard arrest took place, the police will ask for an arrest card to be returned only under court order.

If the arrest had taken place in New York State, Menard would have been able to purge both his FBI file and his file in the state's computerized criminal data bank.

When Wall Street firms began firing people who had only arrest records, however, it was revealed that the procedure was quite complicated and very few people (about 3,000 per year) took the opportunity [CW, April 22].

Judge's Statement

"A survey by the New York Civil Liberties Union indicated that 75% of New York area employment agencies would not accept for referral an applicant with an arrest record . . . . Another study of 75 employers indicated that 66 of them would not consider employing a man who had been arrested for assault and acquitted.

"At the least, an arrest record is likely to lead to further investigation; and if it is convenient to fill the job before the investigation is complete, the applicant is effectively denied employment because of his record . . . . So long as there exists an employable pool of persons who have not been arrested, employers will find it cheaper to make an arrest an automatic disqualification for employment."

– Chief Judge David L. Bazelon, U.S. Court of Appeals

As Aid, Not Issue

Mass. Primary Sees Two Candidates Use Computer

BOSTON – The Massachusetts primary elections brought many surprises, not the least of which was the computer-assisted primary victory of a Jesuit priest over a U.S. Representative in office 28 years.

Also, a candidate running for U.S. Senator is presently using computerized mailing lists to compile "more personal" letters to registered voters in the senatorial race.

Computer professionals may be trying to keep the machine out of politics when its use – or misuse – has become controversial. The computer has nonetheless found its place in the conduct of the campaign, if not as an issue.

Rev. Robert F. Drinan unseated veteran Philip Philbin for the Republican nomination for U.S. Representative, despite Philbin's 28 years in office.

Favorable Voters in File

Father Drinan, on leave of absence as Dean of the Boston College Law School, used computerization to rate the attitudes of nearly 100,000 voters, to keep track of issues which they considered "sensitive."

When a position paper was ready on an issue, from taxes to the war, the paper was mailed to voters who had expressed an interest in the subject.

Names of voters who were considered negative or antagonistic to Father Drinan's candidacy were not kept in the file, which was processed with computer time rented from MIT.

In the Republican senatorial race, Josiah Spaulding also used computers, but in a different manner.

His workers compiled files by age, occupation, residence, etc., and inserted this information into standard computer-printed letters.

Spaulding's files reportedly contain 150,000 names. Located in a New York service bureau, the list is updated as the candidate meets new potential constituents. The process was referred to as "the new political machine" by a Boston newspaper.

Spaulding contends computerization makes the campaign "much more personal," since individual notes can be included in standard, otherwise "form" letters.

Bootleg Bribe Buys Computer Time

WASHINGTON, D.C. – Expensive government items like automobiles and trucks contain the bold warning that they are "For Official Use Only" and, if a recent incident starts a trend, the warning may have to be painted on computers.

A Canadian newspaper recently reported that a secret underground Pentagon computer was used to compile results of 1,000 attendee questionnaires for the Canadian National Exhibition in Toronto.

A U.S. civilian employee in a Defense Department public relations office reportedly bribed another government employee with "a couple of bottles of Canadian hootch" to obtain a run on the Pentagon machine, which is normally used for secret military projects.

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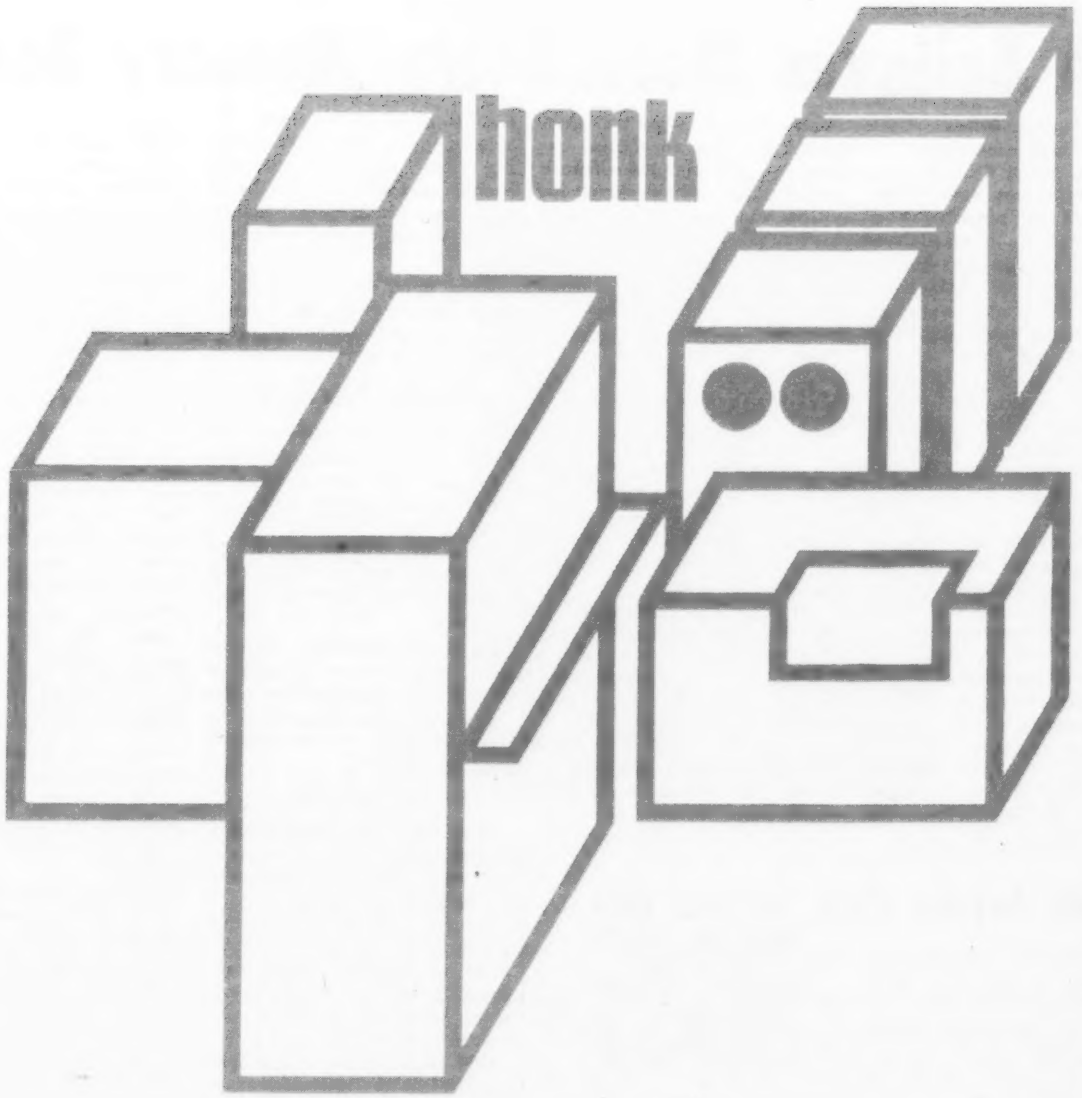

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Comparisons of New IBM, NCR, and RCA Mainframes

Systems / Parameters	RCA 2	RCA 70/45	RCA 3	RCA 70/46	IBM 360/30	IBM 360/40	IBM 360/50	IBM 370/145	NCR Century 300	RCA 6	RCA 70/60	RCA 7	RCA 70/61	IBM 370/155
CPU Monthly Rental ($K)	4.15 to 7.75	3.49 to 10.46	7.75 to 8.25	13.28	1.3 to 3.9	2.7 to 10.2	8.3 to 19.9	10.4 to 18.4	9.8 to 61.0	10.2 to 38.4	11.23 to 33.98	14.4 to 36.8	17.85 to 36.8	21.5 to 45.2
Memory – Minimum, Maximum (K bytes)	64 to 256	16 to 256	128 to 256	256	8 to 64	16 to 256	64 to 512	112 to 512	128 to 2,048	128 to 2,048	128 to 1,024	256 to 2,048	256 to 1,024	256 to 2,048
Virtual Memory Size (Mbyte)	No	No	2	2	No	No	No	No	No	No	No	8	2	No
Cycle Time Per Byte (μsec)	.72	.72	.72	.72	1.5	1.25	.50	.135	.16	.19	.19	.19	.19	.06
Channels Multiplexer	1 (9 trunks)	1 (8 trunks)	1 (9 trunks)	1 (9 trunks)	1 (8 trunks)	1 (8 trunks)	1 (8 trunks)	1 (256 trunks)	1 (8 trunks)	1 (16 trunks)	1 (8 trunks)	1(16 trunks)	1 (8 trunks)	6 (1 or 2 byte; 4 or 5 block)
Selector	4 (2 trunks)	3 (2 trunks)	4 (2 trunks)	4 (2 trunks)	2 (8 trunks)	2 (8 trunks)	2 (8 trunks)	4 (8 trunks	6 (4 trunks) 4 (8 trunks)	6 (3 trunks)	6 (3 trunks)	6 (3 trunks)	6 (3 trunks)	*
First Delivery	3d qtr 1971	4th qtr 1965	3d qtr 1971	4th qtr 1968	2d qtr 1965	2d qtr 1965	3d qtr 1965	3d qtr 1971	1st qtr 1972	3d qtr 1971	3d qtr 1970	3d qtr 1971	1st qtr 1971	1st qtr 1971

* Block multiplexers can be used as selector channels.

The chart compares characteristics of the new and recently announced mainframe systems from NCR, RCA, and IBM. The similarities between the new RCA machines and the earlier RCA Spectra series are apparent. The RCA 2 and 3 are similar to the Spectra 70/45, 46 while the RCA 6 and 7 compare closely with the Spectra 70/60, 61. For users, three groups of new equipment are now available. The RCA 2 and 3 stand alone among the small systems until smaller versions of the 370 series are announced. The medium scale systems offer users the greatest choice with the RCA 6 and 7 comparing with the IBM 370/145 and NCR 300. The 300 approximates the storage capacity of the IBM 370/155 while its processing speeds fall more closely into the medium system group. At present, the 370/155 and 370/165 stand by themselves in the medium-to-large-scale systems group. The earlier 360 models are included for reference characteristics.

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RCA Believes More Users 'Memory Bound'

By Peter L. Briggs
Special to Computerworld

In designing the RCA 2, 3, 6, and 7, RCA has made basic assumptions on potential user requirements. Each user must evaluate these concepts in the light of his own installation . . . today and five years from today.

RCA believes more users are "memory bound" than "processing limited."

A clearly stated corollary to this argument is that most users do not require the additional processing power such as the 370 Series offers for its higher price.

But users are not all convinced they are memory bound. Most users have agreed that they are not using their computers to the fullest possible potential.

However, this is often attributable to the absence of better software or easier-to-use operating systems, or to the types of languages available.

Software "experts" like to sneer at this attitude claiming that users are just not using the existing software well enough.

Users counter argue that they should not have to become experts in using complex software and that the system should do all this housekeeping work without being told how by the user. These users want processor power.

Under this philosophy, one that IBM has encouraged over the last five years, there is a demand for very sophisticated systems software and very time-consuming system operations.

These operations require just as many machine cycles to execute an instruction as do many users' programs. This "overhead," as it is called, makes the system much more livable for the user and improves his utilization without requiring major changes in orientation or in program design.

The result of this processing power philosophy is that the user wants a machine that is powerful enough to give him all this fancy capability and still process his work faster than before.

There is nothing inherently wrong with this attitude and as long as the user is willing to pay for his software he should be able to get it. Users have shown no signs, yet, of preferring simpler systems with less capability over the complex, gadget-laden full 360 Operating System. tem.

There is no right or wrong in this situation between more complex and more powerful software versus simpler, cheaper hardware. The only criterion is what the customer is willing to buy. If the customer wants power, sell him power. If the customer wants "bells and whistles," sell him bells and whistles.

News Analysis

The only alternative open to RCA, and one which only an ex-IBM top management team could possibly carry off, is to recondition the user to another point of view.

Smaller Equals Virtual?

RCA also claims that using a virtual memory actually reduces the main memory requirement for ordinary processing.

But it is not at all clear that giving users a slower, 760 nsec, main memory and a large slower-still virtual drum memory is going to put work through the machine any faster.

IBM chose the path of increasing the internal effective speed of the main memory through the buffer approach, one that makes the machine operate pretty closely to the speed of the 80 nsec or 120 nsec buffer. IBM also expanded the size of its main memories and reduced the price from about $1/byte to about 35 cent/byte for core memory.

Packaged Memory

Standardized memory configurations, about which RCA makes great claims for its new equipment, are hardly new. Honeywell had the same type of thing in its 200 Series equipment. Honeywell did not, of course, make it switchable between processors because its customers were rarely that involved with on-line systems or multi-system shops.

There is a very real advantage to having a spare memory around to back up the on-line system, or to being able to work on one 'bank' of memory at a time while keeping the rest of the memory running. There is, however, a price and that price comes when the user is trying to access the memory of a large machine.

When there are several programs running simultaneously, or nearly so, in the same machine, and when there are several on-line applications involved, the number of conflicts between needs for the main memory could become very expensive and, in fact, could limit the performance of the system severely.

The larger a machine, the more likely that there will be conflicts between various programs for main memory. If a 512K machine has the same addressing scheme and the same logical channel configuration as a 64K memory, then there could well be problems.

Standardized memories do have a clear and uncontestable advantage to the manufacturer – they make the price for producing memories lower by increasing the production volume of standard units. This reduction in production costs might account for a considerable portion of the difference between the price of, for example, an RCA 6 and a 370/155 with the same size main memory.

Eleanor Snyder Gets Second Life

BALTIMORE – Computers have been accused of many things, and murder is the latest.

That's only partly true, but the inconvenience, shock, dismay and embarrassment caused by an erroneous obituary is real.

Officials of the magazine which published the death notice have apologized to the husband of the "deceased," blaming a "computer error" for his inconvenience.

An official of the city's Health Department, Mrs. Eleanor M. Snyder, says that she is healthy indeed, despite her "obituary" published in the August issue of the *Journal of the American Dietetic Association.*

Mrs. Snyder is a lifetime association member, and receives the monthly magazine as part of her job-related membership.

Her husband wrote to the American Dietetic Association, which promptly returned his correspondence: "Through a computer error, a bill for dues was sent to the deceased Eleanor Synder, who had been dropped from membership," the letter explained.

When the bill was returned marked "Deceased," association officials checked their roster, finding only the "active" Mrs. Snyder. Result: obituary.

Increased Internal Speeds Claimed for Century 300

(Continued from Page 1)

The 300 processor is composed of separate units, an instruction setup unit and an instruction execution unit. Since each has its own port to memory, instruction setup time can be eliminated in many instances due to the parallel mode of operation, NCR said.

18 Operations

NCR claims that up to 18 operations are possible because of the channel system available to the user.

The multiplexer can accommodate up to eight devices operating on an interleaved basis, each of which can transmit data at a rate as high as 187K byte/sec. Total throughput of the multiplexer cannot exceed 210K byte/sec, NCR said.

Six 4-position selector channels with a data rate of up to 850K byte/sec are also available, each equipped with its own 4-byte buffer.

Optionally, the 300 may be equipped with four additional channels with eight positions each. Rated at 1100K byte/sec, each channel is equipped with two 4-byte buffers.

The 300 has a set of 68 instructions, including fixed and floating point operations.

A limitation carried over from the older machines is the lack of anything but storage-to-storage instructions. Indexing is permitted; the 300, as do the 100 and 200, has 64 index registers.

NCR claims an exceptional throughput rate of 4.3 Mbyte/sec, attributing it to two basic architectural characteristics – the capability of simultaneous and independent access of four memory modules during a memory cycle and the system's four-way memory interleaving.

The memory storage unit is divided into units of 128K or 256K bytes. These are further subdivided into four modules of 32K or 64K each.

Consecutive words of data are stored in adjoining modules, each of which has three ports, enabling the system to address up to 12 bytes of information simultaneously, NCR said.

Console Has CRT

The operators console follows a recent industry trend in being equipped with a CRT to enhance operator/system communication. The display unit is said to facilitate a multiprogramming environment by providing such data as setup instructions for the operator notification of programs terminated, peripheral status, reconfiguration instructions, and a review of job queues and program priorities. Four levels of paging are provided.

The new NCR Century 300 offers a wide range of peripheral units, permitting flexibility in the design of system configurations. The system is compatible with the Century series' two smaller members. Basic memory is 128 kbyte expandable to 2048 kbyte with a cycle time of 650 nsec.

All peripherals of the Century 100 and 200 can be used with the new system, NCR said. In addition, two new peripheral units are said to offer more latitude in system design.

The NCR 650 drum with a capacity of 4.2 million bytes is one of the new units. It has an average access time of 8.3 msec and a transfer rate of one Mbyte/sec. Also available is a controller which is designed to increase the capacity of the recently announced NCR 657 disk unit. The controller allows operation of the 657 in either a 30-million byte mode or 48-million byte mode.

All software developed for the Century 100 and 200 models will be usable with the 300. This includes the Neat/3 Assembler and three levels of Cobol up to the full Ansi specifications. Three levels of Fortran are also available, with a full Fortran IV at the high end.

An operating system that allows multiprogramming has been developed for the 300. It features job accounting, job scheduling, common systems disk and program library, file and unit sharing and system-aided recovery.

The price range of the system is from $15,000 to $50,000/mo NCR said. The first customer delivery is scheduled for February 1972.

IBM 370/145 to Use Semiconductor Main Memory

(Continued from Page 1)

of almost one-half.

Block multiplexing, up to now restricted to the large IBM systems, is available as a no-charge option on the 145. When used in conjunction with rotational storage devices, such as disk drives, block multiplexer channels can increase total system throughput by permitting increased amounts of data to enter and leave the system in a given time period.

The block multiplexer can be shared by multiple high-speed I/O devices in much the same way that a normal multiplexer is shared by low-speed units.

The standard configuration of the 370/145 will include the ability to emulate most DOS programs under OS control. Integrated emulation of earlier systems is also available.

In contrast to the pricing of the 155 and 165, IBM will not charge for these features on the 145. The cost of the 1400 series emulator on the 155 will be $3,950/mo while the OS/DOS compatibility will cost $5,450/mo.

System Storage

The 370/145 is available in six main storage sizes, ranging from 112K bytes to 512K bytes. The 145's main memory has a fetch cycle of 540 nsec for four data bytes or eight instruction bytes.

The storage cycle is 607.5 nsec for four bytes. This includes the time necessary to generate automatic error correction codes.

The basic machine cycle of the 145 – the time it takes to perform one microinstruction – ranges from 202.2 to 315 nsec, IBM said.

For example, an eight-bit addition microinstruction takes 202.5 nsec; a 32-bit microinstruction takes 247.5 nsec.

While microprogramming is used in other IBM computers for control functions, the 145 is the first to have the microprograms stored in a reloadable control storage.

A 145 user is supplied with a disk containing all the microcode required for a specific configuration, which could include, for example, the microcode for emulating the IBM 1400 Series and 7010.

The microprograms on this disk are loaded into control storage through a small read-only device in the console. The basic 32,000 bytes of control storage can be loaded in about 45 seconds, according to IBM.

The total amount of control storage required in a configuration depends on the features the customer wishes to implement.

If more than 32,000 bytes of control storage are required for such functions as emulation and optional channel controls, the control storage area can be expanded by 2,000-byte increments to a total of 64,000 bytes by utilizing a portion of the main memory.

The 145, IBM said, offers more and faster channels than were previously available to users of IBM's medium-scale computers. Up to five channels, providing a maximum total data transfer rate of approximately 5-million byte/sec, are available.

Increased channel capacity – especially the availability of block multiplexing – permits users to expand their multiprogramming operations because it enables the 145 to operate with the recently announced IBM 3330 and 2305 disk storage devices, according to IBM.

Disk Storage Facility

The 2319 is said to offer users of the 145 large-capacity direct access disk storage for general data and programming systems.

A 2319 facility accommodates three IBM 2314 disk drives and provides up to 87-million bytes of on-line data storage. It attaches to the 145 CPU via an integrated file adapter implemented through circuitry and microcode.

This eliminates the need for the conventional disk control unit. By attaching up to five more storage modules using 2316 disk packs, a total capacity of about 233-million bytes can be achieved, IBM said. The 2319 has an average access time of 60 msec.

The 145, as do the 155 and 165, offers users a choice between 15 or 85 character/sec keyboard-printer consoles.

A second 15 character/sec keyboard-printer console can be installed in an area of the installation away from the CPU to permit remote operation and independent printing of messages for that area.

Two timing devices are included in the 145 – an interval timer that logs execution of short-duration tasks and a time-of-day clock for job accounting and teleprocessing.

Users of the 370/145 will be able to run their 360 programs with little or no reprogramming, IBM said. Programming systems support is provided by extensions of both the operating system (OS) and disk operating system (DOS).

An OS/DOS compatibility feature is standard with the 145. It enables DOS to be run under OS. This will allow the new OS user, IBM said, to execute his DOS programs without reprogramming and to take advantage of the data base and multigramming potential of OS.

Both DOS and 1400/7010 emulators can operate together under OS control.

Price Summary

Monthly rentals for typical configurations of the 370/145 will range from about $14,950 (112,000 bytes of main storage) to $37,330 (512,000 bytes).

Purchase prices will range from about $705,775 to $1,783,000.

First customer deliveries will be scheduled for late next summer.

The IBM 2319 disk storage facility, along with the integrated file adapter, will rent for $1,550/mo, with a purchase price of $71,400. The availa bility will be the same as the Model 145.

Brownout Effects Unknown Now

By a CW Staff Writer

NEW YORK – Fall arrived last week, straddled by a heat wave and accompanied by severe power brownouts and blackouts.

Computer users have reported no emergency shutdowns, but one stated he may not know "for two or three weeks, maybe even a month" if there was garbled data.

One of the city's largest users of IBM equipment stated he "couldn't convince management" to keep some sensitive measuring devices that could have alerted operations managers to dangerous power shortages.

The brownout level in New York was an 8% cut, the tolerance limit for IBM/360 equipment. The measurement specialist stated that a minor fluctuation below last week's level could have caused havoc in a computer, and it could be weeks before generated data might be tested, or used on other projects which would uncover the errors.

The user suggested that turning on an office air conditioner, "or even a light," could have caused the fluctuation necessary to bring such a failure.

Faster Access Assured by GE

(Continued from Page 1)

The 635 will process data received from GE-PAC 4020 front-end processors.

The 4020 is manufactured by the GE Process Control Division, which with the GE Time-Sharing and Communications System Division, comprises GE's data processing operation.

GE sold its computer manufacturing division to Honeywell earlier this year. An existing super center now operating in Cleveland is serving more than 100 users and this will be connected with similar centers in Los Angeles and Teaneck, N.J.

As part of they network reconfiguration GE will add a second 635 for backup. GE is stressing alternative computing availability. Standby power sources at the super centers to guard against failures will be included in the network plans.

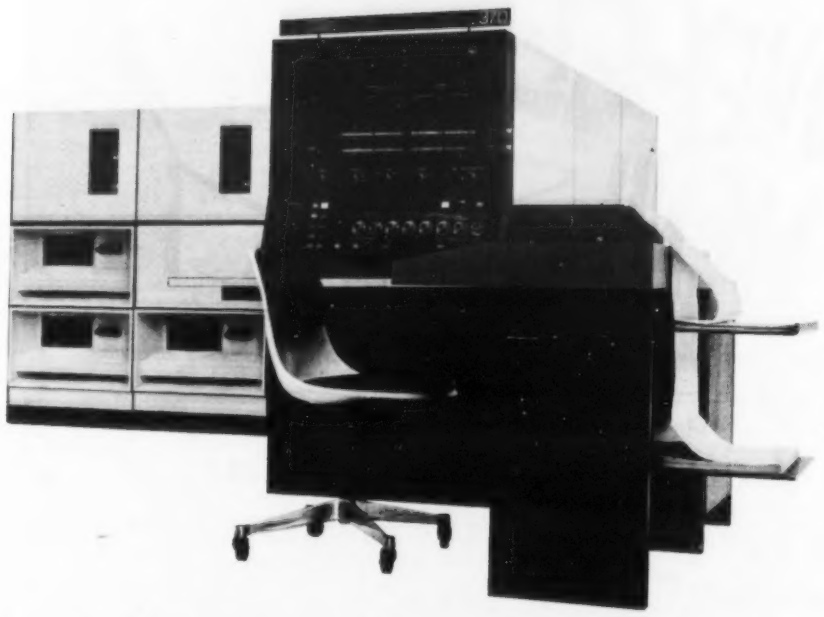
The existing time-sharing services that will be offered by the consolidated GE network include Basic I for beginning users, Mark I dedicated-access service, and Mark II service for larger users. The GE 605 service for users with large-scale data bases also will be included.

Two new services will be added. A "super reliable" 24-hour-a-day premium-priced service will be available next year. In addition, a new service called "interprocessing" will allow users to integrate their in-house batch computer with the GE time-sharing network.

IBM introduces all-monolithic technology, memory and logic. And a new computer that makes the most of it:

System/370 Model 145.

You might call it a new era of computers, or a new generation, or a technological breakthrough. But what really counts is what it means to you.



The hottest concept in computer technology

System/370 Model 145 is the first general-purpose business computer with 100% monolithic circuitry. Including main storage.

The use of this technology with its very high circuit density cuts main storage space in half.

Monolithic technology also speeds up the computing process. And improves reliability as well.

New advancements in speed

Model 145 is 3 to 5 times faster than System/360 Model 40. 5 to 11 times faster than System/360 Model 30.

And that's another reason it's the natural system to move up to if you're a Model 30 or 40 user.

Features, features, features

Like the other computers in the System/370 line, Model 145 is newly engineered inside and out. It's loaded with features.

Like four selector channels. So you can run more jobs and get more work done in the same time.

Like reloadable control storage. So you can have features like block multiplexing, 1400 and 7010 compatibility, and DOS emulation at no extra charge.

Like our new low-cost, high-speed disk facility (the 2319) that holds 87 million characters. And attaches directly to the system without the need for a separate control unit.

System/370: IBM's computer line for the '70s

With System/370, whatever you've got to get out gets out a lot faster.

With any model, you can get our new high-speed printer (the 3211). It fires out numbers and letters at the rate of 2000 lines a minute. Faster than you can blink.

With any model, you can also get our new high-speed disk facility (the 3330). It can hold up to 3½ times more information than our current files. 800 million characters in all. And it can send it into your computer up to 2½ times faster. At a rate of 806 thousand characters per second.

We think it's the best file around.

Revolutionary new product line

But perhaps the most amazing thing of all is that we've been able to make System/370 this advanced while still making it compatible with System/360.

And you also know with IBM you have the support of the most complete program library in the world. As well as the support of our Systems Engineering and Education services.

We've used a lot of words to describe System/370 Model 145. Like 100% monolithic circuitry. Like faster speeds. Increased performance. New features. Greater reliability.

These words aren't empty chatter.

Everything we've said is backed up by hard facts.

Our products change. But our philosophy doesn't. We want you to get the most out of your computer system.

System/370. The performance computers for the seventies.

IBM

Editorials

Don't Drop the Baby

In a recent advertisement, ITT succinctly summed up the responsibility problem that has become acute in a computerized world. We think the statement should be called to everyone's attention.

"When quality falls, voices rise. These complaints are not caused by failures of technology. But by failures of humanity. By people's attitudes.

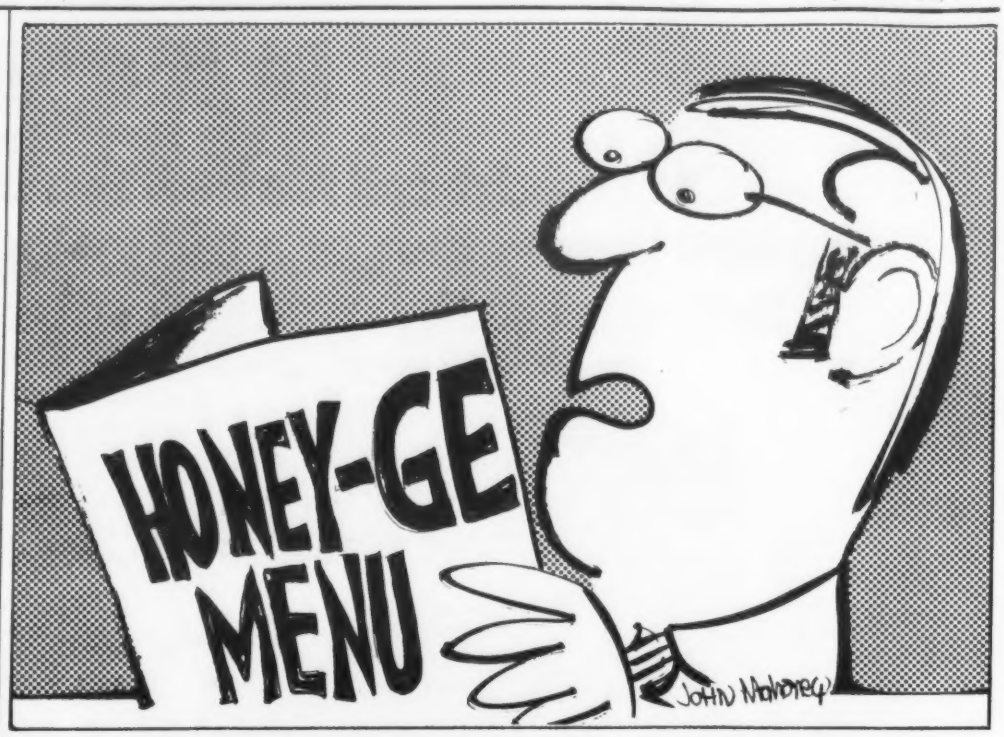
"Suppose you were told that hospital personnel are permitted to drop one-tenth of one percent of all babies. Or that you must tolerate at least two mistakes a year in your monthly bank statement.

"Acceptable? Not likely.

"Yet people still say 'nobody's perfect,' and allow themselves a certain percentage of error at work.

"This attitude must be overcome. And we believe it's humanly possible.

"People must be encouraged to develop, voluntarily, a personal commitment to doing the job right the first time, every time. To develop a 'zero defects' attitude. One that rejects a standard of doing it right *most* of the time."



'I'll Take Two Systems From Column A and One From Column B.'

D.C. Data-Line

... After 19 Years in DP Bob Jones Is Unemployed

By Alan Drattell
CW Washington Bureau

WASHINGTON, D.C. – Bob Jones, 44, is married and the father of five children, ranging in age from seven to 15. He owns a comfortable home in suburban Fairfax, Va.

Bob has 19 years' experience in the data processing field. On Aug. 15 he was laid off from his $19,500-a-year job as senior programming analyst and project director with C-E-I-R Division of Control Data Corp. in nearby Bethesda, Md. He had been with the company for nearly eight years.

"Our division," he said, "had three cutbacks over the past year."

Bob is one of an army of EDP people walking the streets of U.S. cities today because of what has been euphemistically termed by the Federal Government a "readjustment" in the economy.

A year ago, a man with Bob's stable employment record and vast EDP experience would have had little problem relocating. Today, because of the first depression ever to hit the data processing industry, he is still hunting for work.

Consider Bob's credentials. Before coming to C-E-I-R he spent seven years as chief programmer and then project coordinator with Sylvania Electric Products Inc. Prior to that, he was in the Air Force and spent nearly four years as a programmer. He has worked with various computer systems, including CDC 3300 and 6600, Univac 1108 and IBM second- and third-generation equipment.

He has a B.S. degree in mathematics and physics from Northeastern University, and has studied toward a Masters Degree in business administration. He also holds the Certificate in Data Processing from the Data Processing Management Association.

Bob's professional activities include long service with the Association for Computing Machinery, including a stint as chairman of the ACM 1962 national conference in Syracuse, N.Y.

He describes himself as a middle management man – "not technically the performer nor the director of the whole operation."

Since he left C-E-I-R, Bob has approached job hunting systematically, checking the ads in newspapers, filing with the Civil Service Commission and taking the senior level exam for GS-13 and -14 positions, registering with some 40 executive recruiting firms on the East Coast and in the Midwest, contacting the Department of Labor's computerized job bank in the Washington area, and sending letters "blind" to about 60 companies.

"I'm open to any challenging offer," Bob said. "I'm willing to go almost any place."

Friends have also provided leads. "But that doesn't mean there are jobs available," he added.

To date, Bob has had four or five interviews, one of them being for a position in sales. One of the jobs looked promising, but he still has not gotten any type of firm offer.

He has had to apply for unemployment compensation, and his wife, a registered nurse, has gone back to work for the first time in 15 years.

"We have fixed expenses, such as the mortgage on our house," he said. "My wife's income helps; I had some severance pay and we have some cash reserve.

As for himself, Bob is optimistic although this is the first time he has ever been out of work. "I know it may take a little time to get relocated," he said. "But I'm optimistic because I have something to sell; I have capabilities."

Letters to the Editor

All System/3s Can Compute Square Roots

In your Aug. 19 issue a Winston Brooke rightly complains about "looking down our noses at the 407." However, it seems he is guilty of the same type of thing. He is "looking down his nose" at the System/3 when he asks if you know any System/3 which can compute square roots.

Brooke should be aware that all System/3s can compute square roots and that square root is a standard operation code of the RPG II for the System/3.

In fact, it would behoove many 360 users to agitate for upgrading for 360 software to the System/3 level.

T.W. Dowling, C.D.P.
Manager, Data Processing

States Steamship Co.
San Francisco, Calif.

University of Bridgeport Is a Happy NCR 200 User

I have just finished reading "California Colleges Say NCR 200 Fails in Requirements," by Phyllis Huggins [CW, Aug. 26] and I am very unhappy with the alleged comments made by the University of Bridgeport.

The university does not use Cobol as its prime language for students, although some students do use it. We have never requested, nor has NCR ever committed itself to provide, a compile-and-go Cobol for us. We do use Cobol for all administrative applications and we are pleased with the present level of development of the NCR Cobol.

The University of Bridgeport is a happy NCR 200 user. We are the first 200 installation, and have been using the system for some 13 months. We have had problems – I'm sure no computer installation is ever completely problem-free – but overall, we are pleased with both the software and hardware performance of the NCR Century 200 system.

Henry J. Heneghan Jr.
Director, Computer Center

University of Bridgeport
Bridgeport, Conn.

More Than Army Complex Destroyed In Madison Center Bombing

[Re:] your Sept. 2 article on the bombing of Sterling Hall at the University of Wisconsin: there are a number of statements and implications in the article which are incorrect.

The computer complex destroyed is not an Army complex but is part of the general university computing capability. The CDC 3600 computer, housed on the third floor, was not a computing center for the Army but was used by a wide variety of students and faculty. Its primary use was by researchers in the Physics Department, completely independent of the Math Research Center.

The 3600 was also heavily used by researchers in the University Medical Center and Social Sciences, among others. The 3600 had been removed from service during April 1970 and was not in use at the time of the explosion.

A Univac 9300 computer is operated solely as a remote job entry terminal to a Univac 1108 located elsewhere on campus. This terminal was used primarily by the physics and astronomy departments and contains no standalone capabilities.

I am disappointed by your coverage of this most tragic event, and by the implication that an Army complex was destroyed – in fact, a significant tool for education and research at the university was demolished.

Wayne F. Rayfield
Acting Director

Computing Center
University of Wisconsin
Madison, Wis.

Responsible Computer Use Is Justifiable DP Use

Probably the greatest disgrace to the DP industry is the attempt by the computer specialists to justify their jobs as well as the computer installation by trivial use of the facility.

And the cause of it all is the abdication of managerial responsibility (usually through technological ignorance) to the trivia-minded specialists, who actually know very little about how to apply this great potential to achieve the company's goals.

Thus we witness the classic consequence of the computer spouting interminably at the mouth and neglecting its greatest capability – that of computing.

Essentially, responsible computer use is justifiable computer use. What is justifiable? Any course of action that needfully contributes to promotion of the aims and objectives for which the action is presumably taken. For example, a company installs a computer for the expressed purpose of improving and facilitating the organization's information network.

Since the company is organized as a profit making concern, it stands to reason that the chief responsibility of the DP manager is to improve the information network to the "utmost" degree for the least amount of money.

John A. Guin, Director
Business Data Processing Ed.

Riverside City College
Riverside, Calif.

The Case of the City Auditor and the Florida DP Room

In a letter in CW [Sept. 9] a Richard J. Tischhauser commented on the criticism of a Florida city's data processing service by the city's auditor. Mr. Tischhauser felt qualified to make the criticism because he had served as a municipal data processing director and he challenged the qualifications of the auditor (Gene McLeod) to make "any critique in the EDP operations except those involving financial data."

He then went on to query whether the study was an effort to shove the EDP director "out of the door either because he was not politically active or (because he) tended to favor the power not then in," although not providing any evidence that this could possibly be the case here. [In fact, it could not have been. The previous director had left before the study was started.]

Mr. Tischhauser's letter interested me. I wondered as to whether his objection to the auditor providing a critique was justified, either in this particular case or in general. A number of people in our profession seem very sensitive about other people commenting on their performance, and seem to feel that this is somehow improper.

I never quite understood the reasoning but thought it would be useful to look at this particular case so as to try to find out whether there was, in fact, a valid objection.

I therefore asked for, and received a copy of the report. I am sure that Mr. Tischhauser would equally have received one if he had asked for it. I was also interested in comparing the qualifications of the auditor to make his report and of Mr. Tischhauser to make his public criticisms of it.

What the Report Said

The balance sheets shown in the auditor's report came as quite a shock to me. The data processing division has been operating for 18 months and it was legally required to pay its own way by charging the users of its services. However, the figures showed that it had lost $225,000 on a turnover of $1,355,000 or about 15% on a turnover or nearly 50% of its capital.

On the figures submitted, this looked as though it was about to be changed because there were two periods shown, a 12-month period to September 1969 and a six-month period to March 1970.

The figures submitted showed a loss in the first 12 months and a $6,700 profit in the last six months. It could have been thought at that point that mere cost of the setting up of the operation was involved.

Uncharged Rentals

Unfortunately, it appeared that when the auditor tried to prove these figures he ran into a certain amount of difficulty. In the last six months, when $6,700 profit was shown on the figures, he found that no account had been made for two months rental of the equipment amounting to some $22,000.

He also found that although the processing center was occupying 40,000 square feet it was not making any allowance for paying for the area.

He found that the council was being called on to pay other costs such as pension funds which were not being charged to the center, and that in general the place was in a pretty serious financial mess, sufficiently serious for him to have to refuse to certify the accounts as presenting a fair picture.

The Taylor Report

By Alan Taylor

Presumably, Mr. Tischhauser would have no objection to these actions, as they clearly dealt with the financial area. Apparently, he objected to the auditor's action based on the assumption that some of, or all of, the auditor's cirtiques were on technical subjects on which he might or might not be qualified.

Interestingly enough, I found that the auditor has also noticed the fact that he might or might not be adequately technically qualified; he had therefore engaged the service of a data processing consultant to help him.

This seemed a normal enough explanation, but one which Mr. Tischhauser had not thought of. He certainly had included a number of criticisms in his report other than the ones dealing with the books of the corporation.

After reading them (see box), I thought it would be interesting to see whether or not there was any financial involvement, as then Mr. Tischhauser apparently would not have any objection to such critiques.

Department Defended

When looked at, some of the technical objections are clearly criticisms not of the department, but of the council! – problems relating to the accommodation, for instance, or the comments on the lack of priorities.

These were clearly included to ensure that the data processing center area was not blamed when the council was at fault.

Indeed, the auditor mentioned that he had found a prisoner fund account system designed and implemented even though correspondence on file with the data processing division indicated that it was not economically justifiable.

But some of the objections are technical. The question now was whether they also involved financial matters. If so, then even by Mr. Tischhauser's standards, the auditor was acting within his proper scope.

Backup of Tape Files

Take, for instance, the second criticism-control of the tape files. The auditor pointed out that if tapes were lost or destroyed, vital information, which is practically irreplaceable, would be destroyed.

He pointed out that this could result in disruption of the entire operations of the city.

Mr. Tischhauser would not, I am sure, contend the risk of disruption of the operations of a city is to be considered as not having financial implications, so here is one area where although it is apparently technical it is also financial and the auditor was clearly within bounds.

Then there is his point regarding the lack of control of access to the computer center. The auditor's criticism here is that a user could just walk in and go up to the nearest operator and say, "Run this please," and, if the operator liked him, it got run. (I do not know what happened if the operator did not like him!)

Has this any financial implications? I think so myself. Running of programs is like giving an order for goods to a store. It is reasonable to control giving orders for goods to a store. It is reasonable to control giving orders for goods and it appears to me to be even more reasonable to control giving an order for computer use.

When a program is run it is very normal for it not to have known how much it is going to cost. This is like giving the store a signed order for goods with the cost left blank!

Alan Taylor, consultant, writer, and former editor of *Computerworld*, is president of Computer Management Aids Corp. of Framingham, Mass.

That practice is certainly not approved in other areas, because of the risk of running up unauthorized expenditures. I do not see why it should be exempted from such disapproval just because it is in a data processing center.

Then comes the criticism of program testing. The city auditor knows about the occurrences of items outside the data processing department. The output of payroll programs, water and sewer billing systems, etc., has sometimes been erroneous.

Has this any financial implications? Certainly from the point of view of the city it has. Erroneous data output costs the city money. Someone has to pay for the item to be put right, whether it is done manually or within the computer department.

Someone has to pay for the work needed to get the programs put right and the bugs to be found.

Someone has to decide whether to try to get the money out of people who were underbilled, or whether to write the whole thing off. Either way it costs money – city money – and therefore this area of bugs and incomplete testing of programs must also be considered to have clear financial implications.

In fact, I was not able to find a single criticism that did not have some potential financial implications. Even using Mr. Tischhauser's standards the auditor had been completely within his rights.

Mr. Tischhauser, and other oversensitive data processing managers, would help the name of our profession by cooperating with other professionals – such as auditors – so that we can all do our jobs better.

Auditor's Technical Points

The auditor's technical points were:

- Poor, inadequate space.
- Tapes neither controlled nor safeguarded by outside storage.
- No firm budget priorities.
- No firm scheduling of workloads.
- Weak and ineffective personnel training and recruitment.
- Inadequate program documentation and testing.
- Weak input and output control procedures.
- Inadequate division of responsibility between systems analysts, programmers, and machine operators.
- Lack of coordination and communication between the division and the using agencies.
- Overemphasis of hardware in the five-year plan, and little progress in achieving its goals.
- Inadequate centralized control.
- Failure to maintain customer information for an application that was being computerized.

Heard About the Sales Executive Left Out in the Cold?

By Miles Benson
Special to Computerworld

The nattily dressed computer sales executive rises to speak. He has been waiting for this chance for some time. XYZ Corp. is a tough nut to get in to see, let alone have a shot at making a software sales pitch to its best technical people.

The session goes well. At least, for a while. Then, gradually, the flow of questions, the opportunity for interplay, dwindles, like a faucet shut off. What went wrong? William F., the sales executive, may never find out.

Common Problem

The problem which plagues William F. strikes at many managerial people in the fast-paced computing field. Successful in moving up the management ladder, they have failed in another way – their technology has grown rusty. William F.'s fatal error was to misuse a buzzword.

Viewpoint

The alert technical people in his sales audience caught the error, pressed deeper with their technical questions to test him out, unearthed the rust on his technology. The ensuing credibility gap destroyed his effectiveness.

John F. is a middle manager in the computer center of a paper products firm. His technology is rusty, too, and he knows it. But what can he do? Going back to studying "Principles of Operations" manuals is beneath him, he feels.

Besides, admitting his technical weakness may lead to loss of confidence from his subordinates. His reaction? He blocks all attempts at change. He goes "by the book." Documented ground is secure ground, and besides, a procedures-oriented ship is a tight ship. His organization is decaying from the inside, but John F. is helpless to stop it.

Ken T., manager of data processing for a trucking company, knows his technology is rusty, and he's doing something about it. He reads the technical literature from *Computerworld* to *Communications* of the ACM. He's up on all the latest buzzwords and techniques.

But he's overconfident – he continually directs the use of advanced technology unsuited for the task at hand. You can't make a Snobol application out of payroll, and his troops know it. They are getting a tremendous learning experience, but a bad reputation for aborted projects and inefficient programs.

Out of Date

Frank L. was a top programmer 10 years ago. He believes in his technology, never realizing that it's 10 years out of date. Now he's supervisor of a R&D team for a leading aerospace company, and he directs that all their work be done in Assembly Language because it's more efficient and versatile. He's right, of course, but his R&D team spends so much time coding, it seldom brings a project to the point where it can pay off for the company.

As a group, they're all 10 years out of date, R&D hasn't contributed a new idea to the company in some time, and it'll soon become the victims of a corporate cost-cutting campaign.

All of these managers suffer from the same problem. Their reactions to it differ, but one way or another it's eating away at their managerial effectiveness.

A manager must be concerned with the three p's – people, paper, and politics – or he's not doing his job. But in computing, the tide is running too fast for that to be enough.

Yesterday's predictions are today's facts, or fantasies. The computing manager has a special added task – understanding his technical limitations, and keeping up-to-date.

It's not easy, in a field where a self-created information explosion threatens to inundate us all with knowledge.

But the alternative is professional oblivion.

After the Debugging, Ohio's 'Leads' May Show the Way as Law Enforcement Tool

By Cornelia M. Parkinson
Special to Computerworld

COLUMBUS, Ohio – They're getting the bugs worked out of Ohio's Leads (Law Enforcement Automated Data System).

A full message-switching system plus computer file inquiry system, Leads uses an IBM 360/50 with an IBM 360/50 backup to give round-the-clock service to 280 terminals, yielding 33,000 to 40,000 inquiries daily.

After a swift 2-1/2 years of study, planning, fund raising, and obtaining needed interagency cooperation, Leads went on-line with 44 terminals late in 1968. During 1969, while about 200 new terminals were being added, downtime averaged 6.5%, about half of which was for testing.

By April 1, 1970, Leads files held information on 6,544,000 registered vehicles, 8,250,000 drivers, and 17,000 stolen vehicles.

Because of the original peculiarities in the software which caused the computer to use excessive time polling terminals, it was decided to program Leads under IBM's DOS (Disk Operating System). OS (Full Operating System), at that time, didn't fully support QTAM (Queued Teleprocessing Access Method) message switching.

Starting with an IBM 360/40, with the message-switching program under DOS/QTAM, programmers had 10 terminals online, testing. So far so good. More terminals were added. Suddenly the system refused to open.

QTAM is shut down once every 24 hours and, upon reopening, the program must take a few minutes to initialize files and tables, etc., before message processing can begin.

With 15 to 20 terminals on Leads, the system could not get out of the initializing phase. It was felt that polling (on a 15-sec cycle) might be using all the computer time. Seemingly, a mere 10% of the anticipated network of 150 had put Leads out of business.

Buffer Too Small

Action was immediately started to bring in the 360/50 while programmers searched for a possible bug. Within three weeks it was found: a buffer in the operating system was too small and was acting as a bottleneck in the transfer of data within the system. Buffer size was increased; the system was off and running.

Installing the 360/50 proved a wise move, though difficult to quantify exactly because of rapid expansion of the network during the time of installation. Present consumption of total computer time by the on-line system (polling terminals, switching messages, controlling line) is a relatively trivial 15%.

A different problem was posed by the backup computer owned by the state Department of Finance. This department decided to switch from DOS to OS for state payroll, appropriation accounting, etc.

When Leads computer (still on DOS) was down and had to be operated through the finance computer (on OS) the finance programs had to be delayed until Leads was brought up again. As this was unworkable, it was decided to switch Leads also to OS.

During switchover, both computers ran several hours daily under OS, the remainder under DOS. One complaint voiced by system users is that records written under DOS are not accessible when the computer is operating under OS.

OS records contain an extra control character; all DOS records must be rewritten to include this character. Program consultants consider this a flaw in the manufacturer's software – a flaw which cost Leads $100,000 for reprogramming.

Another problem, currently controlled, may recur with new situations. Leads is interfaced with other automated data law enforcement systems, including the FBI's NCIC (National Crime Information Center). NCIC's computer operates under BTAM (Basic Teleprocessing Access Method), a close relative of QTAM.

Leads and NCIC computers each assume mastery, each poll asking for traffic, and neither computer wants to talk to the other.

The problem, solved once, came up again with installation of a second line from Leads to NCIC under OS. IBM's experts spent about three weeks hunting programming bugs to get the computers on a friendly basis again.

Washington Wrap-Up

NBS's Branscomb Speaks to MIS Society Meeting

WASHINGTON, D.C. – The environment in which federal agencies operate – which includes being under the scrutiny of the Congress and the press – discourages the sharing of management mistakes, Dr. Lewis M. Branscomb, director of the National Bureau of Standards, said recently at the second annual meeting of the Society for Management Information Systems (MIS).

Branscomb discussed "information for policy and a policy for information."

The vast size of the federal establishment, according to Branscomb, also affects what information gets to top-level management. He cited the case of the President who, although he has three million staff members, must often rely on others outside this official family for meaningful information.

The advent of computerized information systems, he said, puts raw input data close at hand, but those in the Federal Government who feel their jobs are to stay out of trouble and to keep their bosses out of trouble sometimes tend to see a danger in this data.

At the same time, he added, the Federal Government "offers an extraordinary and interesting testing ground for MIS." For one thing, he explained, computers and programmers are widely available.

Earlier, Dr. Clarence Walton, president of Catholic University in Washington, told the nearly 300 attendees in his keynote address that managers cannot be effective unless they "understand society as a whole."

He added that a man who manages by intuition "knows the hopes and psychology of his workers and has a keen sense of shifting values."

National Job Bank Gets Senate OK

The Senate passed and sent on to the House a bill calling for establishment of a nationwide computerized job bank aimed at matching job openings with unemployed and underemployed. The project, which would be administered by the Department of Labor, is part of the Omnibus Employment and Training Opportunities Act of 1970.

Chances of the measure, which doesn't have administration backing, passing this late in the session are slim.

The job bank program is intended to identify sources of available manpower supply and job vacancies, match them up, and provide an expeditious means for referring and placing individuals in the jobs.

The bill calls for "maximum effective use . . . of electronic data processing and telecommunications systems in the development and administration of the program."

The Secretary of Labor would be authorized to make grants to state or local agencies for the planning and administration of the program, including the purchase of equipment.

The Labor Department also would have the authority to contract with public or private agencies or organizations for experimental or demonstration projects to improve the effectiveness of the program.

The department would have responsibility for establishing rules and regulations for the conduct of the program, including the setting up of standards to assure nationwide compatibility of data systems used in the project.

Commerce Forms Technical Data Service

In a move aimed at simplifying and increasing public access to federal publications and data files of interest to the business and technical communities, the Commerce Department last week announced establishment of a national technical information service, which will incorporate the functions formerly handled by the clearinghouse for scientific and technical information, previously part of the National Bureau of Standards.

The move actually is little more than an organizational change, a regular Washington ritual. No special funding is provided for the new operation, and there are no immediate plans for acquisition of computers or other new equipment.

The clearinghouse presently operates an IBM 360/25, and has access to computers at the Census Bureau.

David Sworn In As Science Adviser

Dr. Edward E. David Jr. was sworn in last week as science adviser to President Nixon and as head of the Office of Science and Technology.

He replaces Dr. Lee A. Dubridge, 68, who had resigned.

David, a graduate of Georgia and Massachusetts Institutes of Technology, was executive director of communications systems research for Bell Laboratories.

Service Rebundling Urged

CHICAGO – Paul W. Williams, president of Boothe Computer Corp., a computer leasing company, based in Park Ridge, Ill., has called on computer manufacturers to rebundle their computer services, charging that the unbundling of services has cost computer users "untold millions of dollars."

Williams contended that "unbundling together with the general downturn of business has probably set back data processing computer utilization at least two years in that companies have been hard pressed to afford the cost of unbundled services made mandatory by some computer manufacturers."

If your computer has a habit of going "Out to Lunch," it may be starved for power.

Balance its diet with a GE PowrLok all solid-state uninterruptible power system!

When it comes to electric power, computers need a steady diet. Even minor power fluctuations or disturbances of millisecond duration can cause parity loss, memory loss, systems interrupts and downtime.

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To avoid these unappetizing possibilities, fully-utilized real-time centers as well as data processing operations have installed General Electric PowrLok uninterruptible power systems.

A PowrLok system is a buffer between incoming feeder line disturbances and the computer, filtering out voltage and frequency variations. In the event of momentary or sustained loss of normal power, precise, regulated power is supplied continuously.

GE's PowrLok uninterruptible power system will enable you to attain maximum utilization of your computer resources. PowrLok all solid-state systems now protect computer installations throughout the world. Applications range from communication/information systems to instrumentation and process control . . . even intensive care units in hospitals, where complex closed loop monitoring systems help guard lives.

If you can't afford to have your computer go "out to lunch," write GE's "Power Dietician," Power Electronic/Interface Section, Custom Power Equipment Department, P. O. Box 16867, Philadelphia, Pennsylvania 19142. We'll show you how a PowrLok system can balance your computer's power diet, through GE's unmatched experience in the control, protection, and distribution of electric power. 350-01A

GENERAL ELECTRIC

State DP Problems Come Under Review At Nasis Annual Meeting in Seattle

By Robert Glass
Special to Computerworld

SEATTLE – The National Association for State Information Systems (Nasis) tackled a host of state data processing problems at its second annual meeting.

The group met controversial topics head on, as evidenced by these quotes from various speakers:

On privacy and data banks: "... 1984 is rushing up on us awfully fast ....The people in this room (Nasis) are the last hope."

On reapportionment: "The use of computers does not guarantee honest reapportionment and redistricting."

"On the census: "This was the most accurate and reliable census ever taken."

On measuring the effectiveness of work done under federal grants: "We have failed miserably at the federal level in accomplishing this."

On health services: "We are fast going out of the realm of the reasonable on health insurance costs ....We are moving toward the $1,000 a day hospital room."

Encourage Communication

Nasis was founded 2-1/2 years ago to encourage communication among state government data processing organizations.

Typical members of Nasis are heads of data processing for their respective states and there is also a strong growth of interest among legislative personnel, with 17 state legislators at the Seattle meeting.

Future plans of Nasis include an information systems seminar for the National Legislative Council, to introduce state legislators to the concepts of information processing. Federal funding has been requested to help support this activity.

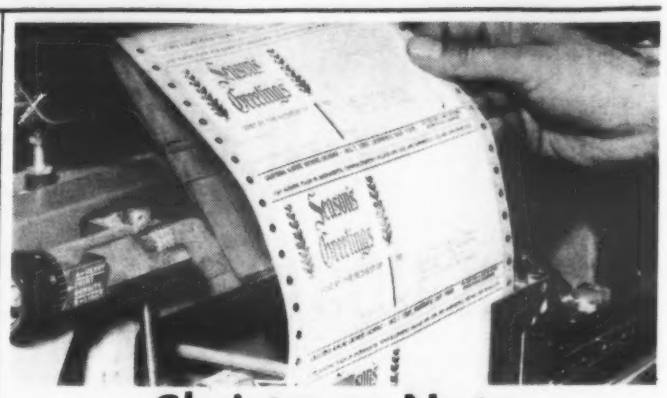
The newly chosen full-time director of staff services for Nasis, Charles R. Rowan, expects to strengthen the intergovernmental interfaces of the group. A $50,000 matching grant received from the federal Office of Economic Opportunity should give Nasis some ongoing clout.

Lively Session

The most lively session occurred the first afternoon, when Dr. Robert J. Gallati, director of the New York Identification and Intelligence System, spoke on "Suggested State Guidelines; Protection of Privacy ..."

Introduced as a "provocateur," Gallati made the previously mentioned comments about privacy and 1984, and went on to ask Nasis to help prevent the creation of national data banks.

The discussion following Gallati's talk was extensive and audience reaction varied from limited concern with the privacy problem to opposition to the roadblocks privacy considerations would throw up in planning efforts.



Christmas Nuts

When orders for Christmas gift packages of almonds are received at the California Almond Growers Exchange, the addressing information is programmed into an IBM computer. Special Avery Co. self-adhesive address labels on pin-feed backing paper are then run through a chain printer which imprints the addressing information, including the name of the sender. The labels are then fed through a forms burster, which separates the labels into singles.

U.S. Drug-Smuggling Crackdown Shows Results With DP Networks

SAN YSIDRO, Calif. – Six months after a computer network joined "Operation Intercept," the government's drug-smuggling crackdown, the amount of illegal marijuana seized here has nearly doubled.

The operation has been in effect for about a year, but the network of nearly 100 TWX terminals and the Burroughs B5500 computers was added last March [CW, March 4].

In the last three months, according to the Associated Press, the amount of marijuana impounded at the San Ysidro-Tijuana crossing has increased to 3,083 pounds, up from 1,603 pounds for the same three month period last year.

Much of the credit goes to the data banks in California, Texas, and Washington, D.C., where information on "suspects" is stored. The data banks indicate which cars should be given more thorough border checks.

COMPUTERWORLD

1970 MAINFRAMES SUPPLEMENT

September 30, 1970

When it comes to selecting the right machines for their data processing needs, prospective users can be a lazy lot.

Over the years, they have been accustomed to a *carte blanche* approach to buying computers and related equipment. Today, the luxury of keeping up with the guy down the street, of buying the latest, fastest, most powerful mainframe available, has taken the plunge. Belt-tightening is now a national EDP sport, and with it, users are seeking the best way to get more "bang for their buck."

While the need for data processing equipment still exists, the prospective user can ill afford to be lazy. Cost justifications have become as integral to daily operations as product lines, and EDP executives are beginning to come out from under original manufacturer blankets.

Unless it is absolutely necessary for firms such as insurance companies to acquire larger, more powerful central processors, businesses in today's computer community are finding it economically feasible to stick with second and third generation equipment.

The attitude of sticking with present equipment for reasons of cost and efficiency is enhanced by a growing trend among users towards alternatives to outright purchase of new equipment.

Increasing cost-consciousness is helping promote heavy investigation of and turning to the second-hand (used) and leasing computer markets. Here, renting or buying a piece of equipment can be an extremely reliable process because the user knows he can specify a particular configuration and, given a period of time, the vendor, a leasing company or used equipment dealer, can always deliver it.

Faced with the choice of renting it, buying it, leasing it from a third party, or entering the used market and getting it second-hand, today's user must recognize different rules with respect to these methods of acquisition.

The current breed of EDP manager has to be more sophisticated and more aggressive as a buyer in order to get the best deal for his company. Oftentimes he has a personal stake in making the right choice; for saving his own job is a function of saving his company money.

A certain amount of maturing precludes choosing the right machine. In this supplement, CW examines the alternatives to this selection, showing why, in the midst of an economic slump, it is time for the user to grow up.

Leasing - What It Means to Users

By Don Strong
CW Supplements Editor

The essential benefit of leasing is that the user has no capital investment of his own to make.

The leasing company purchases the equipment according to his needs and specifications, and, by charging a few thousand dollars of monthly rent, enables the user to install a system which will enhance and speed up his business operations while affording him the luxury of conserving both cash and working capital.

After he has decided upon leasing as the best mainframe alternative for his organization, the user must then choose between either operating or financial lessors. The former handles short-term rentals, while the latter, also known as a "full-payout" company, will write a lease for longer term periods.

Which Way to Go?

Which way to go is a difficult decision for the user to make. However, his final choice usually depends upon the commitment he is willing to make on the equipment leased.

Generally, if the customer simply wants to try hardware for a year or two, to "see how it works," most likely he hasn't made plans to take a position on equipment that will automatically turn in the lowest cost.

If this is his stand, he will probably choose the operating lease, where he can use the equipment, though paying premium prices for it, for a short time and perhaps, at the expiration of the contract, purchase his own system.

However, if the user is willing to make a long-range commitment to equipment, he will then do business with a "full-payout" company. Here, the lease period may range from two to 10 years, with three or four years being the average contract term. In selecting this mode, the user has shown he is concerned for the lowest possible use-cost over a particular stretch.

Regardless of his choice, operating or financial, the user will find he can usually get a better deal by renting equipment from third party firms rather than the original manufacturer.

Cost Factor

Because cost justification is such an important factor, the basic advantage a user sees is that he can acquire equipment at lower rental prices. Rentals from computer makers are generally higher over short-term periods because manufacturers assume the average use of their equipment per customer to be X number of months and they then must amortize several expenses such as research and development costs.

Therefore their charges are greater. Leasing companies meanwhile consider the following in arriving at their charges for equipment: mainframe costs, operating expenses, and profit.

Another significant difference between the two types of leasing companies exists in the area of profits.

(Continued on S/Page 3

". . . . The man who can't haggle for a good trade is outdated in a buy, sell, swap second-hand market."

The Chemistry of Trading: Looking at Used Computers

(Story on Page S/4)

Evolution Replaces Revolution?

New IBM, RCA Products Emphasize Better User Value

By Frank Piasta
CW Staff Writer

Recent product announcements by IBM and RCA seem to point to a trend in the industry to give the user more value rather than startling new technology.

IBM's June announcement of the System/370, which might be termed an enhanced 360, was followed by RCA's introduction of a series of four systems that seem to be an evolvement of the current Spectra/70 line.

Notably absent from the new products was the kind of radical change that resulted in what a top RCA executive called "highly traumatic experiences." This feeling echoed the thoughts expressed by IBM's Thomas J. Watson at the introduction of the 370 when he referred to "mistakes" that were made by his company in introducing the 360.

He indicated that rendering the company's former systems obsolete was one of these mistakes.

The new sytems from both manufacturers are maintaining compatibility with their predecessors. In both cases, the companies stress that programs written for the old computers can be used on the new.

Continuity with the second generation of computers is being maintained by the availabilty of emulators in the new systems. The RCA systems offer the users emulators for both the RCA 501 and 301, as well as those for the IBM 360 and the 1400 series. The 370 is available with emulators for the most popular of the IBM second-generation computers.

Approaches Vary

The approaches taken by each of the two companies to the design of the new systems vary markedly. The 370 sytems use the same memory buffer system, called a "cache system," that was first introduced with the 360/85 and later used on the 360/195. The cache technique allows the CPU to achieve very high internal speeds by accessing from a small high-speed buffer memory while using a relatively slow main memory. The high speeds may not be attainable if the programming is not suitable to the method, however.

The RCA approach calls for an extremely large, in the Mbyte range, fast auxiliary storage that acts as a storage space for program segments, called pages. Of particular value to time-sharing and other multiprogramming applications, this "virtual memory" gives the programs the illusion of having virtually unlimited amounts of memory available.

Comparisons of the RCA 2 and 3 systems with the 370 will have to wait until the smaller members of the 370 family are announced. However, a few comparisons can be drawn between the RCA machines and the 360 series.

The user of a 360/30 has a maximum of 64K memory available to him, with a cycle time of 1.5 μsec. The 360/40, the next step upward, would allow him to increase his memory capacity to 256K and the internal speed by almost twice that.

RCA Cycle Times

The cycle time of the RCA 2 and RCA 3 is 1.44 μsec, accessing two bytes each cycle. Memory capacity begins at 64K, the upward limit of the 360/30, and extends to 256K bytes, equal to the largest 360/40.

The 370/155 is more powerful than the RCA 6 or 7. The cycle time of the 155 is .12 for two bytes in contrast with a .765 timing for four bytes on the RCA machines. Memory capacities of the two systems are identical, with the range available extending from 256K to 2,048K bytes in both cases.

The use of standardized memory modules in the RCA systems is claimed by the company to be one of the principal user-oriented features. Every computer in the new RCA series is equipped with memory modules identical in design and manufacture to every other. This differs from the approach taken by most other computer manufacturers, who produce different memories for different computers.

RCA claims that the most important benefit of this technique is a reduction in manufacturing cost, permitting a correspondingly lower cost to the user. Memory standardization is also said to offer users a number of other advantages. Because of the standardization, memories are more easily expandable, switchable from processor to processor and interchangeable with two or more processors.

These features may be particularly important in multisystem installation where an operator could use this flexibility to achieve higher throughput on all of his systems.

Because the memories are switchable, they are also interchangeable. RCA said that this is particularly important to on-line installations, where backup computers are required. Primary and backup systems, according to RCA, no longer need to be identical. Thus a present dual installation that has two 360/50s back to back, for example, might be able to get along with an RCA 3 backing up an RCA 7. A considerable reduction in overall system cost is claimed for this method.

Mainframe Price/Performance Ratings

Price Comparison

Pricing Element	IBM System/370 Model 165	CDC 6600	Burroughs 6500	IBM System/370 Model 155	CDC 6400	Univac 1108	GE 655	Honeywell 8200
Processor Monthly Rental	$51,500 (1,536K-char memory)	$85,585 (1,310K-char memory)	$84,900 (1,573K-char memory)	$28,000 (768K-char memory)	$35,335 (655K-char memory)	$35,285 (786K-char memory)	$38,500 (786K-char memory)	$44,951 (786K-char memory)
Processor Purchase Price	$2,480,000 (1,536K-char memory)	$3,895,500 (1,310K-char memory)	$3,627,600 (1,573K-char memory)	$1,308,000 (768K-char memory)	$1,446,900 (655K-char memory)	$1,544,400 (786K-char memory)	$1,600,000 (786K-char memory)	$1,958,400 (786K-char memory)
Processor Monthly Maintenance	$5,580 (1,536K-char memory)	$7,787 (1,310K-char memory)	$1,445 (1,573K-char memory)	$3,040 (768K-char memory)	$3,807 (655K-char memory)	$3,670 (786K-char memory)	$2,285 (786K-char memory)	$3,456 (786K-char memory)
Equipment Maintenance	Bundled	Unbundled	Bundled	Bundled	Unbundled	Unbundled	Bundled	Bundled
Software Products	Unbundled (1)	Unbundled (2)	Bundled	Unbundled (1)	Unbundled (2)	Bundled	Bundled	Bundled
System Engineering Services	Unbundled	Unbundled	Bundled	Unbundled	Unbundled	Bundled	Bundled	Bundled
Customer Training Courses	Unbundled	Unbundled	Bundled	Unbundled	Unbundled	Bundled	Bundled	Bundled
First Delivery	April 1971	Late 1965	Sept 1969	Feb 1970	Early 1966	July 1967	Jan 1971	May 1969

NOTES: (1) Unbundled if released after June 23, 1969.
(2) Unbundled if released after January 1, 1970.

AUERBACH

Performance Comparisons

Comparison Factors	IBM System/370 Model 165	CDC 6600	Burroughs 6500	IBM System/370 Model 155	CDC 6400	Univac 1108	GE 655	Honeywell 8200
Machine Cycle Time(1) (μsec)	0.080	0.100	0.600	0.115	0.100	0.750	0.500	0.750
Max. Memory Capacity (K char)	3,072	1,310	3,145	2,048	1,310	1,572	1,572	1,048
Integrated Circuits	Yes	No	Yes	Yes	No	No	Yes	No
Operating Support	OS or DOS	SCOPE	MCP	OS or DOS	SCOPE	EXEC 8	GECOS III	OS/200
On-Line Maint. Diagnostics	Yes	No	Yes	Yes	No	No	No	No
Extended Core Storage	No	Yes	Yes	No	Yes	Yes	No	No
No. of Peripheral Processes	0	10	0	0	10	0	8	0
Simultaneous Instruction Execution	Yes	Yes	Yes	Yes	No	Yes	Yes	No
Max. Disc Subs Capacity (M char)	800	838	2,000	800	838	172	306	280
Max. Disc Transfer Rate (K char/sec)	806	418	248	806	418	156	324	416
Average Disc Access (msec)	30	60	60	30	60	75	26	50
Max. Mag. Tape Transfer Rate (K char/sec)	320	240	240	320	240	192	160	224
Max. Printer Speed (lines/min)	2,000	1,200	1,100	2,000	1,200	1,200	1,200	825
Max. Card Reader Speed (cards/min)	1,000	1,200	1,400	1,000	1,200	900	900	800

NOTE: (1) Depending on system architecture, these times represent either buffer memory or core cycle times. Machine cycle time by itself is not necessarily a direct measure of total system throughput.

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No Capital Investment in Leasing is Big Plus for Users

(Continued from S/Page 1)

Operating companies are constantly faced with the worry of guessing right as to the investment of funds in particular equipment for rental. Their position on a piece of hardware is rather precarious, for they must recoup the price of equipment by renting to a steady stream of users.

Rentals Risky

The hope is that somewhere along the line they are going to make a profit, charging very closely what they charged the first user. Because their risks are greater, the rentals are very expensive. Some leasing companies often wind up with inventory that simply isn't moving.

Others are plagued by users who may want to cancel a lease or back out at any time during the contract term. To meet this situation, short-term lessors make provisions in the lease for terminating by assessing users what is called a "nominal" fee. In defense of these apparently "punitive measures," it must be said, however, the history of computer leasing has shown that many users have proven unsure about their choices of equipment or commitments; therefore, the "nominal" fee seems only a natural safeguard.

As with an operating lessor, "full-payout" leasing firms afford the users the chance to get data processing equipment according to their particular configurations.

However, with financial firms, the cost basis of buying such equipment is the same the user would have if he were buying from the original manufacturer. This includes certain discounts that are passed on the user, in addition to services such as maintenance and refurbishing.

Lower Rental

Another benefit to be accrued is that "full-payout" leasing companies, by reducing their own investments, can lower monthly rental prices for their customers.

The majority of leasing companies are of the "full-payout" type, and a great portion of these share concern for equipment longevity, the amount of difficulty in releasing hardware. This is an important consideration, particularly since the profit of these firms is generally realized on second- or third-time renewals.

According to Zenon L. Gronley, vice-president of leasing at Greyhound Computer Corp., "We know that there is a good amount of fine equipment that can be used over and over. What is vital to us, however, is how difficult was it to release this hardware the first time."

IBM Portfolios

Gronley also pointed out that since most leasing companies deal primarily in IBM equipment, there were certain pieces, such as in System/360, that would always find a home.

"Our feeling," he said, "is that industrywide, during the next 10 years there will always be someone around who will need 360."

Agreeing with him are several other leasing firms that indicate their portfolios are comprised mostly of IBM equipment. Additionally, most of these organizations, while highlighting that they can depreciate 360 equipment over a longer period of time, thereby offering lower rentals than Armonk, listed their particular operating credo as "giving users a lesser cost than manufacturers, and having customers retain the equipment for the longest possible time."

"Our profit," one company official said, "is dependent upon the length of time you keep the machine, not on taking another one from us."

Complete Effort

Satisfying the user is an all-out effort with many leasing companies. To accomplish this, they will provide many additional services, such as performing systems studies to evaluate whether or not equipment is being used to its fullest capability. Lessors will also make it a point to tell prospective users that they will receive extras such as equipment refurbishing or reconditioning.

"We realize that as equipment gets older," said Greyhound's Gronley, "the condition it is in, and the maintenance it has received will do much to determine its remarketability and longevity. There are many vital aspects to consider, like what type of use the previous customer gave the equipment, and the types of contract it is under, such as IBM's maintenance and time-limitations agreements.

"However, it is to our benefit as much as the customer's to keep the machine in perfect operating condition."

Because several large leasing organizations have experienced rather severe earnings drops recently, and there seems to be a willingness by the computer community to stick with second generation equipment, it would appear leasing is on the skids.

Yet, many leasing companies feel the current slumps are simply indications of the maturing or levelling out of a new industry. Another observer said: "It could also be a case of inefficient producer having take a posture that third generation will be used for a long, long time at close to the same original rental amount."

One reason offered for difficulties experienced currently by smaller lessors involves computer installation.

Such shortcomings as inability to meet delivery dates and limited inventory further compound the problem.

States Gronley: "Our district managers and field engineers are trained to go out in the field to see that installation is as smooth as possible and that there is a minimal loss of downtime for the customer. Unless an organization is prepared to have their men trained in such a way, then, they are kidding themselves as to how effective a job they can do."

Gronley emphasizes that prospective users would do well to scrutinize carefully to see if a lessor has the manpower, financial resources and capability to put some muscle behind proper installation.

Learning the ABC's of Used Computer Trading

By Don Strong
CW Supplements Editor

Not so long ago, prospective users were as skeptical of second-hand computers as Nasser of traveling El Al. The fear of having paid the ticket price on an ill-fated venture was always there.

Yet, due to several changes in used-computer flight planning, plus a low economic ceiling, the second-hand market has at last gotten off the ground. Today, the number of customers shopping among used-equipment dealers and brokers is growing as fast as airplane hijackings.

Perhaps the biggest reason is that users have become increasingly cost-performance conscious and, like modern sky pirates, more concerned for getting the biggest possible "bang for their bucks."

With businesses daily hunting for new ways to cut back on operating expenses, the traditional attitudes of computer buying have been all but shot down.

In the business of throwing up a lot of flak at these attitudes are a couple of Boston-based "gunners" named A. "Sonny" Monosson and William S. Grinker.

As treasurer and executive vice-president, respectively, for the Boston Computer Group, Inc., an organization providing diversified services to the computer community including leasing and equipment brokerage, both men feel it won't be too long before the used-hardware market starts to expand.

"The historic pattern of buying computers is outdated," Monosson states. "At first, users had to be sold and supported, but now that they are getting a feel for what they are being sold, they no longer act in the same old way. Once they identify a need for a computer, they realize they don't need an expensive, new machine. They just need a computer.

Profit Squeeze

Citing the big squeeze for profit these days, Monosson adds: "People are beginning to call used dealers more and more, saying 'look, I need a 1401 or something,' buying it, and being generally less concerned for support or supposed obsolescence. Businesses are also asking themselves, 'why go through reprogramming and start-up headaches with new systems.'

"They're now willing to find a second generation computer over there in plant Y, the cheapest computer you can get to run the programs, buying it and running them that way."

Grinker, Monosson's colleague at the American Used Computer subsidiary, indicates there is a big push among government and commercial users to break ties with original equipment vendors. "Users can now justify divorcing themselves from original equipment vendors, but most important, they are finding it a more economical practice."

Another reason for the used computer boom of late, Grinker mentions, is the fact that "as the economy goes down and things get worse, the percentage of used sales increases.

Economy Influences

"As the economy swings up, and money gets easier, the percent of used sales to total sales decreases. This is the historic pattern of the mature industry in a used market, and there can be no doubt in anyone's mind what the situation is today."

"What we believe," Monosson says, "is that the used computer business has just become part of this cycle, mainly because equipment has started trickling onto the market."

"Until 1965," Grinker states, "you had no major appreciable ownership of equipment. Second generation machines, totaled up, represented a figure less than $2 billion worth of equipment in private hands. Now, with the advent of 360, 30% of this equipment is out of control of the vendor. and is in leasing company or private hands."

Grinker estimates the average one-place rental stand for a computer is 4.2 years, but seven years on a purchase basis. "We really don't know exactly how things are going to be," he says, "but we do know that equipment will trade. No computer is put to rest after just one user. There is always going to be a secondary home."

Second-hand equipment dealers naturally share these opinions, agreeing that with each new generation of machines, with IBM's unbundling, prices for second-user computers and peripherals have become extremely attractive.

TLW Computer Industries, Inc., Atlanta, for example, expects IBM's 370 announcement to create greater availability of 360s for resale at better prices than ever before.

A company spokesman said 360 resale prices are now at least 30% of new machine costs. "These reduced prices are especially enticing during recessionary times," the official said. "They are apt to be of particular interest to smaller businesses and institutions, and all the more so if transition is being made from tabulating equipment or if computer utilization is marginal."

Less frequent, but nonetheless important, factors in the proliferation of used equipment include liquidation of company assets, mergers or consolidations, internal growth, greater processing needs, and the fact that companies simply go out of business.

Drastic Change

Furthermore, Monosson comments: "There is a drastic change taking place within most companies concerned with EDP today. We are witnessing large and medium organizations of all sizes, but mostly large businesses, creating special staffs or delegating responsibility to certain individuals to acquire and dispose of assets. Most recently, for example, a large insurance company sold on a direct deal a large 360/65 to another insurance company at a very high percentage of retail.

"It was a good deal for both parties, especially for the buyer because his company got equipment for 15% off retail, amounting to quite a savings when you're talking about a $2 million transactions."

Monosson feels that, while many firms have set up special groups to handle EDP machine sales and acquisitions, most data processing managers have failed to "grow up in this manner."

"The challenge to the EDP community in the seventies," he states, "is: can the data processing executive become a businessman, is he a businessman, and if he has the chance to function as a businessman in all aspects of the operations, will he spend or save money for his company."

DP management, he goes on, has been conditioned wrong. "They don't know how to haggle, they don't know how to say yes or no, they can't select properly. All because they grew up in a very fast-growing business and failed to get the necessary trading skills."

Heavy in finance experience and the peculiar ins-and-outs of trading computer equipment, Monosson himself has been well conditioned. His thinking is definitely old-school, but then again, the used dealer business has always been that way.

When he says, quite frankly, "you can't learn this business from books or from business schools, you have to get it the hard way," he means just that.

More on Profits

Commenting on the profits of used dealers, Grinker said: "No one ever knows, really, what anyone makes, in spite of published profit margins, which are usually pretty thin, for this reason. Have you ever seen anyone in the used business going bankrupt, be it used cars, sewing machines, or computers? Go down to any junkyard and you will see that the guy who owns it is probably a millionaire.

"He buys the stuff and it sits there until he gets his price. But, look at his earnings record and you'll see it's pretty slim. That's because he can evaluate his inventory for anything he wants and no one can contest it."

Monosson adds the difference between a dealer and a broker is "brokers will run very short profits, 2, 3, or 5%. But dealers will be at longer margins." His point being, "if you buy well and sell well, there is subtantial profit in the used business."

Yet, getting back to the user, what is his advantage in purchasing second-hand equipment? For one thing, cost savings. Citing a particular survey of an American Used Computer Corp. report, Grinker says: "We have a 360/40H, a full system, available at a 21% discount under IBM; that's a $240,000 savings. Here's a 360/20 card system at a 45% discount, a Model 30 at 30% off, and a second generation computer, a 1440, that will pay for itself in 12 months of use against rental."

Questioned as to how used equipment dealers and brokers set the equipment price, and whether or not there were blue books on computers, Monosson stated: "Since we're actively trading, we will call six or seven people and find out what is on the market. If there is nothing, and there is a demand for a particular piece of hardware, we push the price up and vice-versa.

"It may take about half a day to set the price of new equipment coming on the market. Then, there are certain pieces, like a 1401, where so many exist, the price is rather fixed. Other equipment or systems, meanwhile, many require as long as six months to set the price."

Grinker chipped in with the account of a recent PDP-10 sale. "It was the first PDP-10 ever sold used. And we did it for 40% discount under retail when we finally reached a level where the buyer was price sensitive. However, we were prepared to go lower if we had to."

There is no hard and fast rule you can apply to the used computer business, Grinker explains. "Each vendor's line is different because there are different classes of buyers. The rules you apply to an IBM buyer and the margins you run an IBM deal at, are far different than that which you run competitive deals at. The margins between buying and selling IBM are less than 10%, but that's because their buyers and sellers are usually quite sharp."

While both Monosson and Grinker agree on most facets on the used equipment business, there is one discrepancy. Monosson feels it is not necessary to have equipment physically on hand to sell. "You don't have to have it because you are selling a label that is well known by everyone, generally."

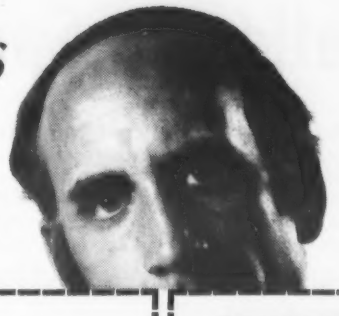
When to Know

His associate, however, states: "I feel you have to see it, smell it and kick it in order to really identify with a prospective sale. The chemistry of buying is still chemistry. People are not getting wheat on the Chicago exchange. It is not immaculate conception. I think the user generally gets turned on when he sees the equipment and this helps solidify the sale."

"Not true," replies Monosson, "I think . . ."

Ah, but that's another story.

What most managers don't know about the computer could make them vice presidents.



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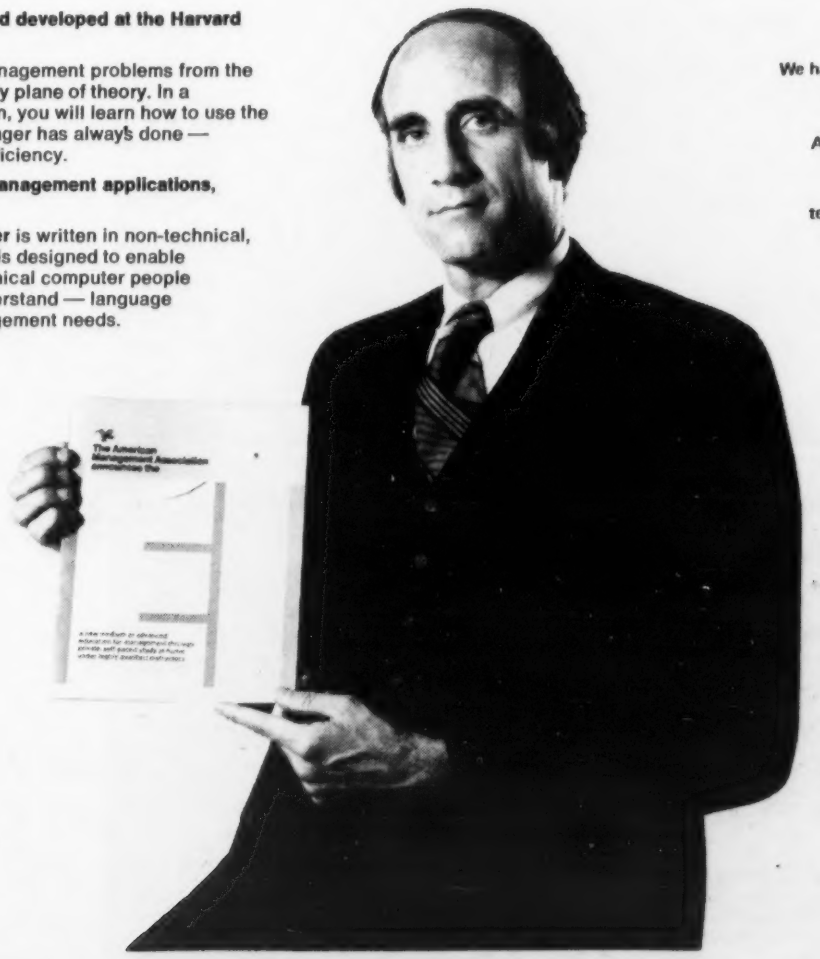

***Management and the Computer* is recommended by Computerworld**

We have often seen consultants' reports which relate the success of computer utilization to the degree of top management participation in defining the systems requirements.

And since the full impact of the computer has yet to be felt on management operations, it is equally important that a thorough understanding of modern management techniques and objectives exists at all levels of management.

Computerworld is pleased to recommend **Management and the Computer** to its readers as an effective aid in preventing a communications gap between top management and data processing executives.

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COMPUTERWORLD

Systems of the Seventies to Spark Trend to LSI

By Carl F. Rench
Special to Computerworld

Evolution rather than revolution will be the nature of technological change as the computer industry ushers in its "systems of the seventies." The advent won't be as clearcut as the arrival of the systems with transistors, or the emergence of systems with integrated circuitry. The change will be much more gradual.

Large-scale integration will be implemented into the full spectrum of EDP equipment. It will span from the smallest terminal to the largest real-time systems. It will include an ever-growing volume for small powerful, free-standing batch processors in spite of the emphasis on the glamour of real-time.

This trend to LSI is currently illustrated by NCR's newest computer family, the Century Series. The Century Series uses integrated circuits throughout processor and peripherals. But it also is "LSI-ready" in that LSI circuit cards can be plugged in to take the place of numerous IC cards.

The primary characteristic of tomorrow's computers will be much the same as today's: better price/performance ratio.

However, these systems will also be characterized by more on-line communications capabilities. We shall see hardware taking on more of what is today software.

The inherent greater reliability of LSI circuitry will fit hand-in-hand with the need for very high reliability which exists in on-line situations. These same on-line criteria will mean that new systems developments will include many fail-safe procedures and features.

Coming of Age

Users will find that on-line communications computer systems will really come of age. Systems will permit more user sharing, and users will be able to run more applications at the same time.

The task of converting work to the new systems will be easier than today. Conversion from early to later systems was difficult because there was little relationship between the two types of equipment in a software sense. And with more recent equipment conversion is handled largely by emulation hardware.

The next stage should see extensive use of "firmware"; that is, microprograms within the hardware which will be able to simulate many types of machines. As this takes hold, it will make conversion and programming much easier.

In other words, users will simply utilize a basic language instruction which will be interpreted through hardware (using a firmware concept) to emulate other machines.

Logic Redistribution

The "systems of the seventies" will have a redistribution of logic; that is, some logic circuits will be taken from the processors and placed in peripherals, terminals, and such devices including powerful small satellite processors. This approach makes a great deal of sense because with the advent of lower-cost LSI circuits we shall be able to alleviate the burden on the processor.

In addition to "firmware," we shall see more time-sharing executive programs and multiprocessor executive programs, from software firms as well as from manufacturers. There will be increasing emphasis on ease of programming, possibly with widespread conversational languages so that individuals can interact with the computer without specialized training.

By the late seventies, we should see truly sophisticated communications-EDP systems fully implemented. This period will reveal further improvements in file reliability, capacity, and accessibility.

Essentially, such developments would be logical extensions of today's approach – to continue to raise the power of the system and at the same time to lower the price.

Carl F. Rench is vice-president, corporate product development, The National Cash Register Co.

CW Survey Shows System/3 Satisfies Variety of Users

The toughest jury for any computer product has returned a verdict on IBM's System/3, including the controversial 96-column card. The decision appears unanimous, as most users polled by CW in an updated continuing survey [CW, July 20] reported complete satisfaction with System/3's price, hardware reliability, ease of use, and aside from isolated installation quirks, minimum occurrence of downtime.

"System/3," said an East Coast industrial housekeeping firm, "offers greater flexibility and ease of operation with the new, smaller format."

A computer operator for an Evanston, Ill., fuel company said the new card format enabled her to cut weekly billing work by one-half day, and reduce monthly billing by a full day.

Although most users say they were first attracted to System/3 because of IBM's glamorous position in the commerical market, their reactions now have since been tempered by practical displays of information processing.

"System/3 is running smoother than we expected," said the EDP manager for a Chicago-based network of travel agencies.

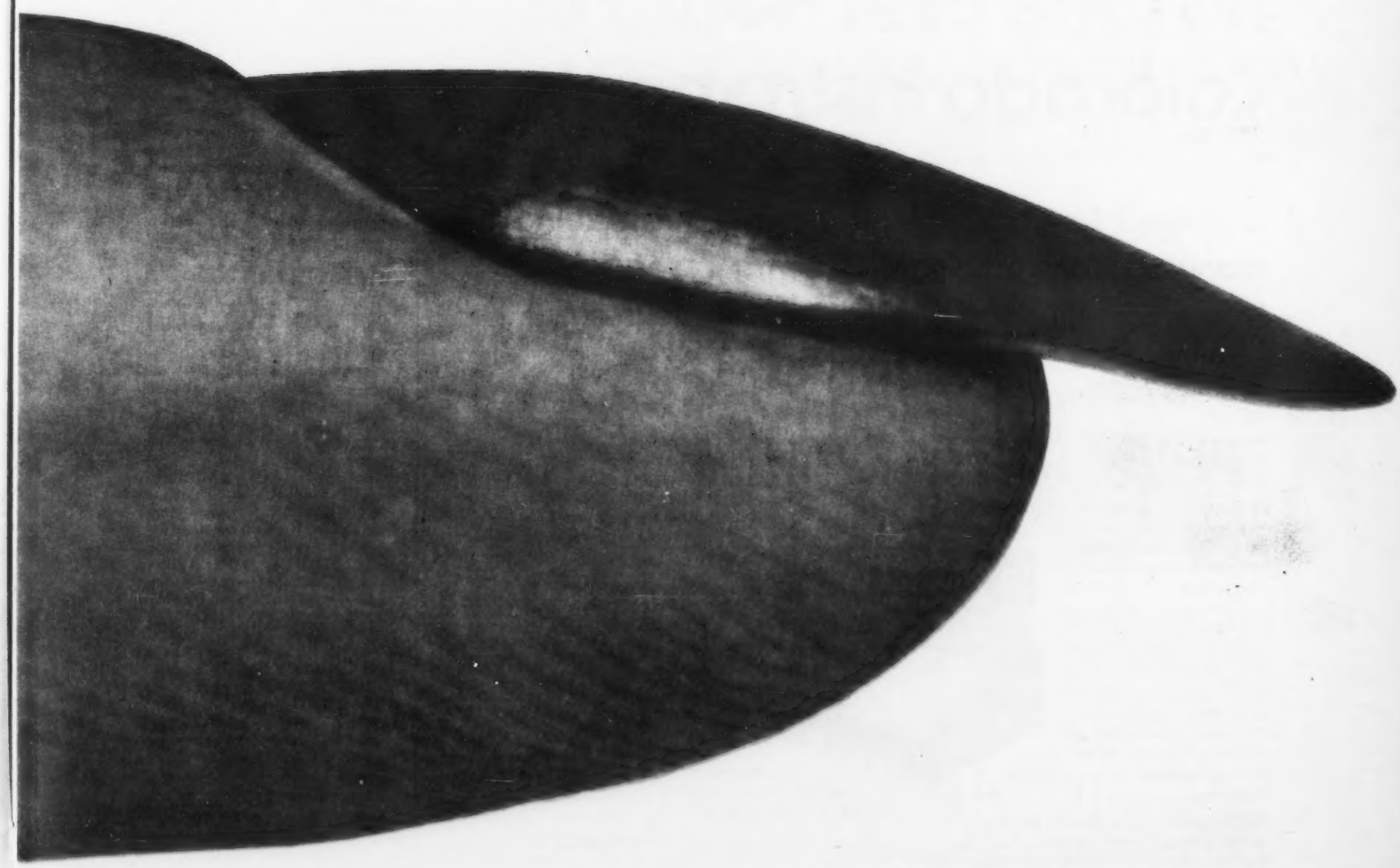
Others agreed, saying it would be nearly impossible to process the same amount of information with such ease and speed with unit record equipment or older machines like the IBM 407 or 402.

One user, a Chevrolet dealer in Harrisburg, Pa., has thrown even further bouquets at IBM, stating that the one "really interesting thing" about his System/3 operation is that "we don't have a single person who is concerned with it full time. It is so easy to use, that we simply read the book and go ahead with our processing."

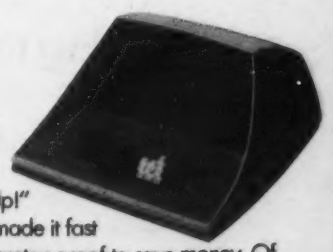
Yet, System/3 has shown itself not entirely a saint in every case. For example, a few users are "thanking our lucky stars for maintaining unit record system as a backup during System/3 installation.

"We had a lot of hardware problems at the beginning," mentioned a New York City engineering firm. "Things like print- and card-fed malfunctions and a faulty data recorder set us down for nearly two weeks.

Despite scattered complaints, users seem to be in agreement on System/3 and most would agree with the Pennsylvania Chevy dealer that "it is a most elegant and economical way to handle administrative processing."



Remember that beautiful girl who thought key-punch was something you drank on Ben Franklin's birthday?



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Dittberner Backs NAS Report, Asks FCC Certification

By Don Leavitt
CW Staff Writer

WASHINGTON, D.C. – Dittberner Associates has recommended to the Federal Communications Commission that customer-provided data equipment be allowed to interconnect directly to com-

Communications

mon carrier networks without the necessity of carrier-provided interconnecting arrangements.

Dittberner added, however, that the customer-provided equipment must meet carrier-developed and FCC-approved standards for network protective capability, if the current DAA-type interconnecting devices are no longer required.

Also, the equipment must be installed and maintained by an FCC-certified installation/maintenance organization or individual contractor, Dittberner concluded.

Dittberner had been asked by the FCC to evaluate the highly technical National Academy of Science's report on interconnection problems released last June.

In its conclusions, the NAS panel had called for a certification program without going into details of how such a program should be implemented.

Dittberner told the FCC that the protection afforded by access devices currently provided by the common carriers is "at best" merely comparable to that of "several other" alternatives.

And, the report added, the alternatives "can result in greater economic benefits, increased competition, a more rapid pace of telecommunication innovation and improved quality of service."

Under the Dittberner plan, a user would notify the carrier of his intention to interconnect non-Bell equipment to the network, and the burden of proof that such connection might cause harm would fall on the carrier.

Dittberner proposed that the FCC should provide both limited test facilities and arbitration services in the event of a dispute that cannot be resolved directly between user and carrier.

Dittberner also said that the FCC should direct carriers to remove all existing tariff provisions which require the use of carrier-owned protection, and control signalling devices.

The tariffs should also be changed to include standards needed for manufacturers and suppliers to provide the protective capabilities.

The FCC should encourage the carriers to sell network protective devices, and should require them to license manufacturing rights, Dittberner continued, in order to speed the innovative process.

The report also urged the creation of a joint council of suppliers, users and carriers, chaired by the FCC, to encourage the dissemination of information to all parties.

Western Union Proposes 45-City Bulk Data Transmission Service

NEW YORK – Western Union has proposed a new data service, Datacom, to be geared to the needs of businesses with bulk information-transmission requirements.

The company has filed with the FCC a proposed tariff, effective Oct. 1, for furnishing data service between 45 large cities. A spokesman said that users in any part of the country may gain access to the service through leased private wire to the nearest Datacom point, with the filed tariff rates applying only to transmissions between the Datacom Service cities.

WU claims that with Datacom bulk users could save as much as 80% of their current costs for transmitting large amounts of numerical and alphabetical information.

The company said that these economies, available on a two- or three-point basis between the 45 Datacom cities, are made possible through methods of channel subdivision that increase the information-carrying capacity of a given bandwidth.

Communications Unit Replaces IBM 2701

NEW YORK – A turnkey system including hardware and dedicated software has been developed by Programming Methods Inc. (PMI).

The PMI Front End Communications Facility (FCF) is a self-contained, preprogrammed system.

According to PMI, FCF can be configured to handle all of the communications functions of the control processor.

With the 360, for instance, the company said that the system can replace the 2701, -02, and -03 Data Adapter hardware as well as the Basic or Queued Transmission Access Method (BTAM or QTAM) software.

With FCF, messages are received, edited, routed, translated to other codes as required, delivered or intercepted and stored for later retrieval or passed on for processing by a host computer.

FCF issues polls and calls as required, receives and evaluates responses and monitors the lines for error conditions.

A record of all traffic through each exchange unit is maintained.

The company said a high-capacity multiline controller has been designed to multiplex a maximum of 128 low-speed communications lines into a central processor.

A synchronous single-line controller, to operate with dedicated lines, includes hardware detection of a sync character and lateral parity as standard features.

The IBM 360 interface provides the logic necessary to connect the FCF to either the selector or multiplexer channels.

Other interfaces currently available are for the Univac 1108 and 419 systems, PMI said.

Deliveries are six to nine months, ARO, and prices begin at $180,000 for the basic system.

Programming Methods Inc. is at 51 Madison Ave.

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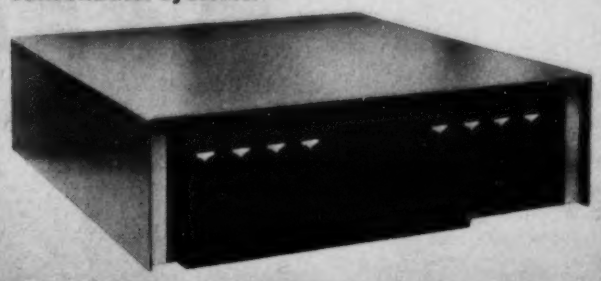

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North Electric, one of the nation's original manufacturers of telecommunications equipment, provides our advanced line of PBX systems and station apparatus.

Expanding this PBX line is Fujitsu, a major Japanese manufacturer known the world over for its communications equipment.

Rixon Electronics supplies data transmission expertise and equipment like data sets and multiplexers.

Rounding out the new UBC family is GDI, Inc., a manufacturer of computer and terminal peripheral equipment, including card punches, card readers and card transmitters.

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So however you've read all about it.

There's a lot more we'd like to please write if you'd like to hear more. We might be able to solve a voice or data communications problem for you.

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Why? Because for one thing INTERCOMM supports applications written in any language, including COBOL, FORTRAN, PL/I, and BAL.

CICS allows BAL modules only.

Second thing: INTERCOMM lets utilities simplify the efforts of the application programmer. The Edit and Output utilities automatically edit and format messages passing back and forth from the terminal to the applications programs. The Display and Maintenance utilities permit the display and modification of any fields within a file.

CICS provides no similar utility capability.

Third thing: INTERCOMM completely separates the BTAM or QTAM interface logic from the user program.

CICS requires that the user include the TP macros as part of each of his application programs.

Fourth thing: INTERCOMM is available for both the DOS and OS users with complete upward compatibility to OS.

CICS is an OS system only.

Fifth thing: INTERCOMM enhancements include Dynamic Data Queuing, Roll-in, Roll-out facilities, Multi-threading within ANS COBOL programs, and an RJE capability.

With CICS, no such facilities are available.

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Programming Methods

Subsidiary of Sylvania Information Systems

CP-1 Provides External 1401 Compatibility on 360s

By Don Leavitt
CW Staff Writer

ELMSFORD, N.Y. – IBM 360 users still heavily committed to operating in 1401 compatibility mode can regain third-generation capability and core storage on their mainframes by using the CP-1 processor from Polydata Corp.

At the same time, the company said, the CP-1 also speeds the processing time required for 1400 compatibility processing.

The CP-1 operates as a peripheral for the 360, and possesses its own 8K or 16K core memory, and logic unit and control console to provide external emulation of the 1400 series. In effect, the CP-1 uses the 360 central processor only as a highly efficient I/O controller.

Because the external unit carries the burden of the processing, it requires only 4K of 360 storage, compared to the 8K to 24K which Polydata said is required for conventional emulation.

Polydata claims that "live" field tests using a CP-1 and a 360/30 have demonstrated a 50% improvement in throughput time as compared to conventinal processing under IBM-supplied compatibility mode.

In addition, Polydata said, because the CP-1 does not require the 360 to be dedicated to compatibility mode, the user is free to execute his third-generation programs simultaneously with the 1400 programs, under either DOS or OS/360. Under OS, the programs can be run in a true multiprogramming, multiprocessing environment, the company said.

With Polydata's CP-1, a spokesman noted, 1400 series programs can also be run on the larger-scale 360s, for which internal emulation and compatibility operating systems were never provided by IBM.

The CP-1 processor is packaged in an aluminum suitcase for portability, and is plugged into either a multiplexer or a selector channel on the 360. The unit is controlled through a console that is a desk-top version of the standard 1401 console, including mode switch, sense switches and manual addressing dials.

Altering the contents of a memory location, normally a function of the 1401 auxiliary console, is possible, Polydata said, by setting the sense switches on or off when the mode switch is in Alter. A plastic overlay identifies which bits are represented by the sense switches.

Polydata CP-1 Console includes all features of the standard 1401 console.

The 1400-to-360 device will sell for between $19,000 and $30,000 depending on the size 1401/1440 being emulated and various options. The DOS version will be available for delivery late this year, the company said, and the OS version is scheduled for early in 1971.

Polydata Corp. is in the Cross Westchester Executive Park.

Vertical Brailler Allows Blind to 'See' Reports, Tabulate Columns During Tests

NEW YORK – An efficient computer Brailler – designed to increase the speed and efficiency of blind computer programmers – is now available free to any blind programmer or training facility.

Called the Vertical Brailler, the program converts individual data records, or entire storage dumps, into a choice of braille formats punched on a slightly modified 1403 printer.

The Vertical Brailler was written by Robert McLean of International Paper, in collaboration with Richard J. Snipas, a programmer, at Bradford Computer and Systems.

Braille is a system of representing each alphabetic, decimal numeric and special character by a different pattern of raised dots within a two-by-three matrix, called a cell. To accommodate the hexadecimal notation of the 360, an optional two-by-four cell has been developed, Snipas said.

He said that the input to the program can include records of any length, from either tape or disk, and the output can appear in either of two formats.

Normal output is the standard 40-character Braille cell line, repeated as many times as is necessary to complete one input record translation. The optional output is the vertical or "Chinese" output, which streams the records down as many pages as are required until the lines are complete.

The vertical option displays entire records in one continuous stream. This allows the user to turn the output on its side and see the relative positions of fields on print records. Snipas noted that the option also allows the user to line up and manually tabulate data printed in columns, during program testing. With the horizontal, 40-cell/line, format, this would be impossible, he added.

The program used the period on the print chain to form the dots that make up the Braille cells. The 1403 printer has to be equipped with a soft backing inserted in front of the print striker, and the Braille is read from the back of the sheet on which it is printed.

The Vertical Brailler requires 9K bytes of storage and a 2400 series tape or 2314 disk unit, and operates under DOS/360 Version 21. It runs at printer speed, according to Snipas.

Richard J. Snipas is at Bradford Computer and Systems, 220 East 42nd St. His company has underwritten the cost of reproducing and distributing the program for interested users.

'Netset' Uses Tariff Rate Data Base, Designs Least-Cost Telecommunications

PRINCETON, N.J. – Using a data base covering rates and other information for basic communications tariffs, the Network Synthesis and Evaluation Technique (Netset) time-sharing service from AL/Com develops least-cost communications networks for the user.

Compared to networks designed by conventional least-distance calculations, Netset-designed networks are said to operate at cost savings up to 40%.

The Netset data base covers Tariffs 255 (rate center coordinates), 260 (Interstate Private Line service), 259 (Wats), and 237 (domestic leased facilities from Western Union) and 263 (long-distance message telephone service). All line types and levels of conditioning are covered, according to AL/Com

The company said that the user's network, of any size, can be analyzed interactively by time-sharing the AL/Com processor. The designer can apply his constraints, working with direct wire networks, time-divison or frequency-division multiplexing, or Wats service, with specified response times.

A spokesman noted that optimal line loadings and concentrator locations can be derived, in addition to the least-cost network configurations.

The AL/Com time-sharing service, including Netset, is available on a local "dial-up" basis in Boston, Buffalo, Chicago, Dallas, Detroit, Indianapolis, Los Angeles, New York City, Philadelphia, San Francisco, and Washington, D.C.

There is neither initiation fee nor monthly minimum for the AL/Com service. CPU time costs 10 cent/sec and connect time, $10/hr.

AL/Com is at One Palmer Sq.

ICP Quarterly Has Discount Plan For Subscribers Who Buy Software

INDIANAPOLIS, Ind. – Starting with the October 1970 issue, ICP Quarterly will effectively become a software "discount store" as well as reference guide.

According to the publisher, International Computer Programs, many of the software firms who list their products have agreed to allow a $100 discount to a buyer if he can show that he came across the program being purchased in the Quarterly.

Under this arrangement, ICP said, an annual subscriber will be given an account number to use in identifying himself as qualified to receive the discount.

The company noted that if a Quarterly subscriber took full advantage of the discount plan, he could realize sizable savings in his software costs, and eliminate the $100 cost of the subscription to the Quarterly as well.

International Computer Programs Inc. is at 2511 East 46th St.

Firm Offers to Lease Mutual Fund Package

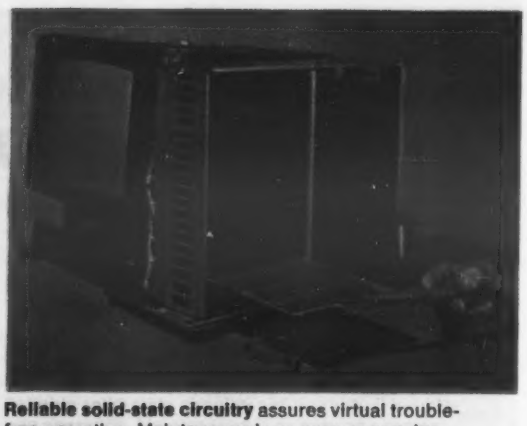
SAN FRANCISCO – System '70, the mutual fund accounting system from Western Operations Inc., is now available under a lease agreement, in addition to the originally announced purchase plan.

The change in availability resulted from recent Internal Revenue Service rulings related to software costs, the firm said.

The system is priced in the $100,000 range, with installation costs, beyond that, varying by user.

Western Operations is at 120 Montgomery St.

1,998 character display (27 lines of 74 characters each) on a 12-inch screen.
A true stand-alone unit—includes communications interface and modular power supply.

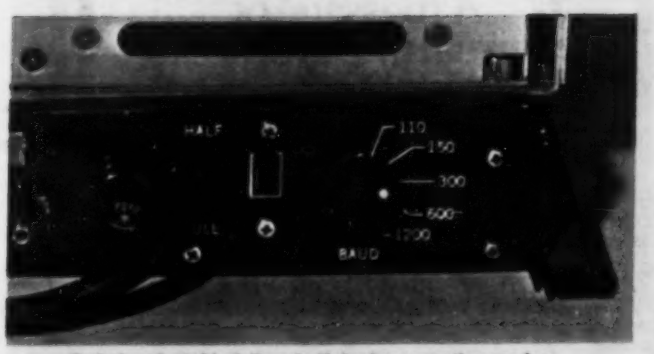


Reliable solid-state circuitry assures virtual trouble-free operation. Maintenance is as easy as opening a drawer.

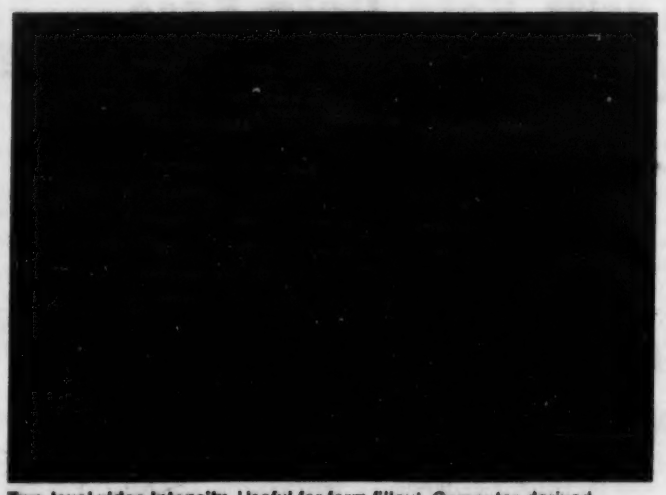
Individual TV adjustments conveniently located up front for optimum operator comfort.

Quiet, solid-state keyboard in Teletype terminal format may be operated remotely.

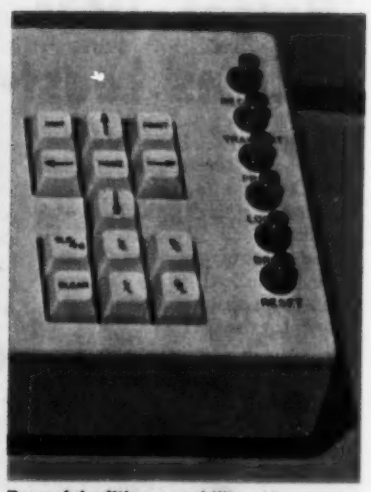
Inside Story of the Video Display Terminal that leaves all the others behind.



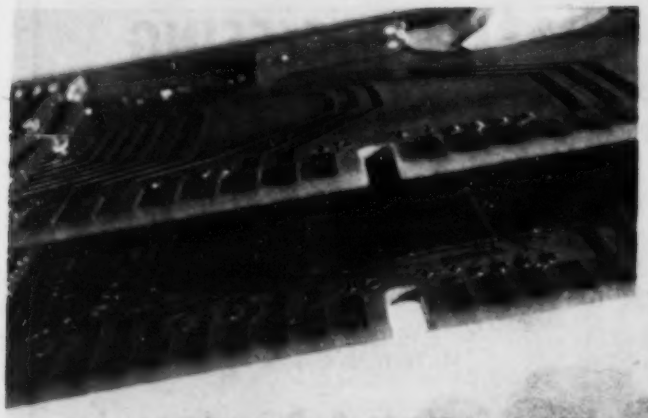
Switch-selectable full- or half-duplex operating modes.
Selectable transmission rates—110, 150, 300, 600 or 1200 baud. Adjustable up to 9600 bps.



Two-level video intensity. Useful for form fillout. Computer-derived protected data is lower intensity; operator-entered data is brighter.
Selective scrolling at any line when under program control; automatically at line 1, unless otherwise directed.
Automatic tabulation in form fillout directs cursor to next entry point.

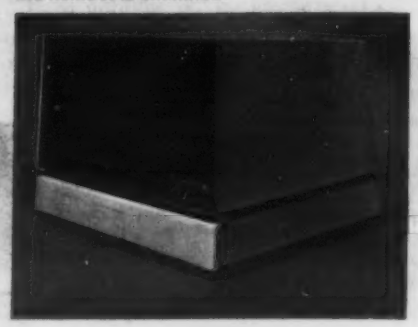


Powerful editing capability—12 distinct keyboard operations, including line and character insert/delete. 10 functions under computer control, including cursor positioning by X-Y coordinates.



High-speed, random-access core memory (2048 x 8) provides flexibility and efficiency consistent with all the unique design features of the Hazeltine 2000.

3 remote monitors may be connected without amplifiers. With amplifiers added, the number is unlimited.



Plus: Low Cost!

$88 per month (12-month rental) plus $20 maintenance.
We'll be happy to demonstrate the Hazeltine 2000 in your offices.

Hazeltine 2000

Hazeltine Corporation
Little Neck, N.Y. 11362
Phone (212) 423-4800

Varian 5,000 Line/Min Printer Is 360-Compatible

PALO ALTO, Calif. – A series of computer-compatible printers developed by the Graphics and Data Systems division of Varian Associates may be four times faster and one-half the cost of existing mechanical line printers.

Designated the Statos 21, the electrostatic printers operate at 5,000 80-character line/min, and typically cost $15,300 in a complete configuration, Varian said. Units currently in use, the company added, print at 1,100 line/min and cost nearly $40,000.

In addition to the Varian 620 series of minicomputers, the Statos 21 printers are designed to interface with the IBM 1130, 1800 and System 360 as well as the DEC PDP-8 and -10 and the XDS series of computers.

Said to be the first of a family of printers, the 21 uses 640 writing heads, or styli, across an 8-1/2 in. or narrower page. Either a 5 by 7 or an 8 by 10 dot matrix is used. It can also produce such graphics as maps and charts at the same high speed, Varian said.

In the Statos 21, the dielectrically coated paper is moved at any computer directed rate up to 10.5 in./sec. The paper transport is the only moving part, which the company says brings new reliability to on-line high-speed printing.

Optionally available is a variable forms control which permits printout on any assortment of business forms. The forms control option is based on read-only memory and provides any sequence of spaces between lines. According to Varian, it represents a state-of-the-art improvement over the magnetic and paper tape loops used for form control in other printers.

In announcing the printer, Varian said it will provide a total hardware and software package. "We will provide the user with a completely functional unit that is plug-to-plug compatible with existing peripheral equipment," said N.M. Johnson, Varian product manager.

The first two models of the 21 series are the Statos 2110 and 2111. The desk-top 2110 uses 8-1/2 in. fan-fold paper. It has both synchronous and non-synchronous paper advancing capability. Basic interfaces for both computer and magnetic tape input are included.

The Model 2111, in addition to the above features, houses the following in its pedestal: high-speed character generation with two sizes and four orientations, plotting capability simultaneous with hardware character generation, forms control, and large-scale computer interfaces.

Both models have options for a paper cutter and tray, pedestal with space for fanfold paper, and plotting and printing software.

Deliveries of the Statos 21 printers are scheduled to begin early next year, Varian said.

The Graphics and Data Systems division of Varian Associates is at 611 Hanses Way.

Low-Cost COM Device From Datagraphix Can Be Used On-Line With 360/25 and Up

SAN DIEGO, Calif. – Available at a price lower than any other recorder manufactured by the company, a new on-line COM unit from Stromberg Datagraphix is 360-compatible.

The 4200 COM recorder converts 9-bit parallel computer output from an IBM 360/25 and up into printed text on microfilm.

It prints output data at a transfer rate of up to 30,000 line/min. Throughput is 13,000 line/min and data is transferred at rates up to 60,000 char/sec.

Character generation is by electron beam extrusion, a process of the company's Charactron-shaped beam tube, used in other Datagraphic recorders.

The 4200 is equipped with a shuttlerless Datagraphix Universal Camera. With this camera, output can be printed interchangeably on roll film or microfiche at either 25X or 42X reductions.

At the 42X ratio, a 4 in. by 6 in. microfiche can contain up to 224 frames of data, the company explained. Sixteen mm roll film can be coded with sequential retrieval marks and recorded "one-up" at 25X reduction with a frame occupying most of the width of the film. Or, the camera can print images "two-up" by reducing the image size to 42X reduction and moving the recording lens across the width of the film.

The 4200 also has the ability to superimpose preprinted background forms over the displayed data, the company said. This is said to enable business forms to be merged with computer-generated information in a single operation, eliminating the need for reprinted forms.

What Kind of Appeal?

According to Don Mitchell, Datagraphix executive vice-president, the 4200 should appeal to companies with relatively small printout applications and large distribution problems. "With only two or three small applications a month", he said, "the recorder will practically pay for itself just in paper and postage savings."

Datagraphix claims the 4200 will give the same performance as the other Datagraphix COM recorders, with the added benefit of turning out EDP reports the same day they're processed.

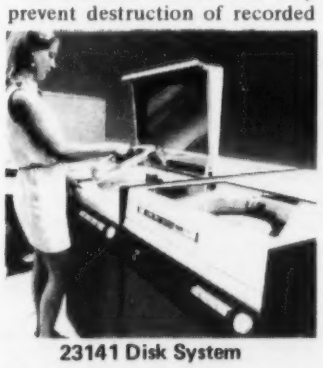
The Datagraphix 4200 COM Recorder is priced at $49,000, complete with camera. Pilot installations of the unit will be made during the first quarter of 1971, with first scheduled delivery of the recorders in the second quarter of the year.

CDC 2314-Compatible Disk Features Faster Access

MINNEAPOLIS – The user of an IBM 2314 disk system can turn to another mainframe manufacturer, Control Data Corp., as a source for an IBM-compatible random access system.

Designated the CDC 23141 Multiple Disk System, the system uses an electromagnetic (voice-coil) actuator and nondetent servomechanism, similar to that used by several independent suppliers of disk equipment, to achieve an average access time of 35 msec. This compares favorably with the 60 or 75 msec average time for the 2314.

An unusual feature that may prevent destruction of recorded



23141 Disk System

data and damage to the disk is the emergency-retract feature. In the event of loss of power, a capacitor in the system sends stored energy to the actuating mechanism, causing the read/write heads to retract.

Available configurations of the CDC 23141 closely approximate those of the 2314. The system can consist of from one to nine 23121 disk storage units and the 23141 control unit. Total on-line storage can vary from 28-million to 234-million bytes, using IBM 2316, CDC 869, or equivalent disk packs.

The CDC system is said to be plug-to-plug interchangeable at the System 360 or 370 Selector Channel level, requiring no modifications to the IBM system.

CDC also states that the users of the 23141 are assured of total data compatibility because the CDC system, handles all software systems and user programs designed for the 2314 as if it were one. Record flow and file scan features are standard on the system.

Fault Detection

The 23141, according to CDC, also offers improved fault detection circuitry, positive air filtration, and superior head design. An additional ferro-resonant transformer and solid-state switches used in the power supply are said to decrease the number of components needed, with a corresponding decrease in the likelihood of failure.

The 23141 is equipped with a read-only memory which contains the resident microprogram to control all system functions and to provide in-line diagnostics. Monthly lease prices, including maintenance, for the CDC 23141 Multiple Disk System range form $2,587, on a three-year lease, for the control unit and four disk drives to $4,312 over the same time period for the control unit and eight drives. Purchase prices for these systems are $113,500 and $187,500, respectively.

The CDC 23141 Multiple Disk System is currently scheduled for delivery nine months ARO.

IPC Communications Switching System Claims Performance, Price Advantages

WAYNE, N.J. – Said by the manufacturer to offer performance equal to or better than "major systems" at nearly half the cost, the IPC 5-15 communications switching system is a turnkey facility including hardware, software, and maintenance, in addition to systems design.

Offered by Integrated Processing & Control, Inc. on a fixed price basis, the system uses the Interdata Models 5 and 15 computers.

The scope of the IPC system depends on the customer's requirements, but generally includes the computer equipment, system software, systems engineering, documentation and training.

As an integrated communications switching system, the IPC 5-15 functions as a free-standing store and forward message-processing system.

It can also be used as a front-end for a data processing system such as the IBM 360, Univac 1108 and Burroughs B5500 to which the manufacturer claims it can be readily interfaced.

A typical configuration would consist of an Interdata 5 and a 15, each with 64K of memory, a 225 card/min reader, a Teletype 35 KSR, paper tape equipment capable of reading 300 char/min and punching 100 char/min, two 9-track 20KB magnetic tape drives, and an 8-million byte drum. The price would be $450,000.

First customer deliveries are scheduled for the first quarter of 1971.

Integrated Processing & Control, Inc. is at 52 Alpine Drive.

Keypunch Replacements-Part VI

Users of Replacements Seldom Revert to Keypunching

By H. Edward White
Special to Computerworld

Although the key-to-tape and similar type devices have now been available to users for more than four years, only about 13% of installed keypunch units have been replaced. Ironically, shipments of IBM keypunch devices still exceed those of all the replacement units combined. Why?

It doesn't sound as though data processing managers are enthusiastic about the new devices, yet they do accomplish what their manufacturers say they will – almost no replacement users have cancelled their new machines and gone back to keypunching!

Computer users have gone through three generations of computers, and may be approaching the fourth. "Unit record" data recording still continues. Why?

One reason is undoubtedly the management time required to make any systems changes. The new computers and all their inherent software problems have kept many potential cost-cutting projects from receiving the proper attention. If this is your problem, you might find that keypunch replacement offers greater dollar savings potential than any other project you could investigate at this time.

Of course, the "old habits die hard" problem may exist in some cases, but we like to think that people who constantly update their computers would devote the required attention to any face of their operation which would improve it.

Are computer users looking for something better than keypunch replacements? Are many of them determined to keep their present systems until a better solution to the data recording problem comes along? The fact that so many of them continue to order keypunches seems to indicate that this may be true.

When the computer user looks at keypunch replacements, what does he see?

First, all of the systems are oriented toward key recording from documents at a central point, with the inherent cost of gathering, transporting, controlling, and filing. Usually an "extra copy" of that document was made just for data recording. The "data gathering" portion of keypunching often slows throughput and adds more to cost than the recording operation itself.

Next, most of the machines are no more than magnetic tape keypunches which operate at electronic speeds. The only major change is that most offer record lengths longer than 80 characters. Character and model displays have been added which primarily simplify and speed error correction, but also make operator training easier.

Operating controls are almost universally identical to the keypunch. Undoubtedly, this simplifies the retraining of experienced operators. But with all of the "convenience" displays, why accept the fact that the machine must be identical to the keypunch?

This article is the last in a series exploring the advantages and disadvantages of keypunch replacement devices.

In the article dealing with systems offering shared components [Part IV, CW, Sept. 16] the author included Entrex and Inforex with those having pooling capabilities. These systems also include disk storage, processing, and editing capabilities which would classify them as part of the keyboard-to-computer systems discussed in Part V of this series last week.

As an example, keypunches have had two programs available from one master program (drum card) since 1949. Now, 21 years and three generations of computers later most 1970 "keypunches" still offer two programs! In contrast, the Calcomp Punchmaster, a "front end black box" for keypunch, which offers many of the advantages of the replacements, has 22 independent programs.

Will the 1970s produce one or more "new generations" of data recorders? Will they be oriented toward centralized recording, or more on the order of "source data" recording, with communications capability?

The machines offered today, perhaps, can be equated to the computers available 10 years ago – not the final answer in computing, but enough better than older methods to justify making the change.

The keypunch replacements of today may not be the final answer, but if they save dollars and improve accuracy and throughput, why not make use of them?

H. Edward White has been an independent data processing consultant for the past seven years. He has had extensive experience with data recording and communications equipment, and is currently manager for corporate planning at I/O Com Inc.

TC-70 CRT Terminal Is 360-Compatible

RALEIGH, N.C. – A CRT terminal, described by Terminal Communications Inc. as "operator oriented," is compatible with the IBM 2740 terminal.

The communications section of the TC-70 operates with standard six-level BCD code, allowing it to be used with the IBM 360 system.

A standard typewriter format keyboard is said to allow the operation of the unit after only a minimum of operator training. The use of a 12-in. non-glare CRT and 1/4-in. alphanumeric characters are said to reduce operator fatigue, increasing throughput.

The TC-70 is supplied in either 512 or 1,024 character versions. Units can be equipped with an RS 232B interface or with internal modems compatible with Bell 103 or 202 Data Sets. A printer based on the IBM Selectric will be available in the beginning of October.

The basic price of the TC Model 70 Video Display Terminal is $4,490. The modems are priced at approximately $475. The on-line printer will add $2,000 to the cost of the terminal.

The TC-70 is currently available on a 60-day delivery schedule.

The address of Terminal Communications, Inc. is P.O. Box 27228.

COMPUTERWORLD

societies

London Data Bank Meeting Nov.18

LONDON – Concern about computer data banks and privacy has finally spread to Europe.

A "Workshop on the Data Bank Society" will take place here Nov. 18 and 19 and will bring together people directly concerned with data banks, including lawyers, trade unionists, government representatives, industrial computer users, and representatives of the computer industry.

The workshop is being organized jointly by the National Council for Civil Liberties (NCCL, the British equivalent of the American Civil Liberties Union) and Allen & Unwin Ltd.

Speakers from the U.S. will include Prof. Alan Westin, author of "Privacy and Freedom" and chairman of the National Academy of Sciences data bank study, and CW staff writer Joseph Hanlon.

J.H. Bonnett, CW European correspondent, is a conference sponsor.

In announcing the conference, NCCL declared that the conference "will be a workshop and not merely a talkshop. Our objective is to produce positive proposals that will find some measure of support in government and industry."

NCCL is at 152 Camden High St., London NW1.

Microprogram Workshop Oct.12

BUFFALO, N.Y. – The 3rd annual Workshop on Microprogramming, cosponsored by the ACM Special Interest Group on Microprogramming and the IEEE Computer Group, will be held Oct. 12-13 at the Statler Hilton.

Discussion topics include architecture and technology, and microprogram representation languages.

Attendance at the workshop is by invitation only. Those interested may obtain an application from R.H. Eckhouse Jr., Department of Computer Science, S.U.N.Y. at Buffalo, 4226 Ridge Lea Road, Amherst, N.Y. 14226.

The workshop fee is $25 for members of Sigmicro, ACM, or IEEE and $35 for nonmembers.

Adapso to Focus On Management And Marketing

NASSAU, Bahamas – Adapso will continue to explore the patterns influencing the growth of the computer services industry and the counteracting problems slowing down its development at the Association's 30th Management Conference to be held at the Paradise Island Hotel, Oct. 14-16.

Study of industry surveys has produced two major areas causing a slowdown in the industry's growth – management and marketing problems. The conference will concentrate on revealing appropriate techniques to improve these areas.

Further information may be obtained from Adapso, 551, Fifth Avenue, New York, N.Y. 10017.

Management Conference

ARMONK, N.Y. – This year's Management Systems Conference will be held in Mexico City Nov. 10-12 and will run concurrently with the Business Equipment Show sponsored by the Department of Commerce.

According to the general chairman, Dr. William H. Evers, manager of operations research for IBM, the conference will explore theory and practice of management information/control systems

Further information may be obtained from Dr. William Evers, Management Systems Conference, IBM, Armonk, N.Y.

NBS to Hold Workshop, Conference on Soft Copy

GAITHERSBURG, Md. – The National Bureau of Standards Office of Information Processing Standards (U.S. Department of Commerce) and the Society for Information Display will co-sponsor a Soft Copy Conference and Workshop, at NBS, here Oct. 6-7.

The conference and workshop will bring together the users and manufacturers of transient displays, both aural and visual, to establish sets of uniform conventions, practices, and proposed standards for controlling soft copy terminals.

The Tuesday morning session will consist of lectures describing current types of displays and outlining problem areas to give the attendees a background for the discussions to follow.

Tuesday afternoon five simultaneous workshops will be held, four on visual displays and one on audio response.

On Wednesday morning, reports will be prepared in the workshops for presentation to the entire conference that afternoon.

Further information on conference registration and fees may be obtained from Eric Swarthe, Office of Information Processing Standards, Room B264-TECH, National Bureau of Standards, Washington, D.C. 20234.

Babbage Society Publishes Bulletin

NORTHFIELD, Vt. – The Babbage Society, a Federated Society of the Society of Data Educators (SDE), is publishing the first "Bulletin of the Babbage Society." The Bulletin is published for SDE members having an interest in the history of computers.

In its lead story, the Bulletin announces the Babbage Society's important discovery of the Grant Difference Engine on view in the Machinery Hall at the Philadelphia Centennial of 1876, as revealed in a photograph supplied by Barbara Charles; origin of the photograph is unknown, but it does prove that the machine was actually completed and exhibited.

Membership in the Babbage Society is available by applying to Arthur H. Pike, R2-76 Union, Norwich University, Northfield, VT. 05663.

The complete COM.

Memorex can supply all the things you need for trouble-free COM operation. Everything from systems analysis to maintenance to our own line of supplies (we even make a unique microfilm cassette that holds up to 2400 pages of print-out). You never have to wonder who to turn to when you need something.

Order our complete COM package including (1) our System 360 compatible on-line 1603 Microfilm Printer with its trouble-free fiber optical system, (2) our 1610 Developer, a table model film processor with automatic threading, (3) the Memorex 1630 Previewer for film editing and cassette loading, (4) the 1620 Duplicator that transfers data from master roll film onto thermal or diazo duplicating film at up to 100,000 lines per minute, (5) the 1625 Diazo Developer which attaches to the 1620 for non-vented anhydrous developing of diazo duplicate film, (6) our 1642 Desk-top Cassette Viewer and 1643 Autoviewer, (7) the Memorex 1650 Viewer Printer that gives high quality, 8½ x 11 inch paper prints in 20 seconds.

For more information write: Memorex/Equipment Group, San Tomas at Central Expressway, Santa Clara, California 95052.

MEMOREX

DPMA's Elliott Responds to 'Challenge' On Standards, Seeks Documented Ideas

By Thomas J. Morton
CW Midwest Bureau

PARK RIDGE, Ill. – R. Calvin Elliott, executive director of the Data Processing Management Association (DPMA), has responded to a "challenge" made by Milton Bryce, a 1970 DPMA conference seminar speaker, that DPMA should start a review board "to establish the framework for issuing all standards" [CW, Aug. 19] and the charge, in effect, that DPMA was "dragging its feet" in the matter of standards.

Regarding Bryce's proposal, Elliott stated that "standards historically had been the concern of the Business Equipment Manufacturers Association (Bema), American National Standards Institute (Ansi) and other bodies.

"If Mr. Bryce has an idea which would permit DPMA to make a genuine contribution in this area, we'd be happy to give it every consideration," he said, "but we have no interest in wasting our time and energies on something which would only tend to cause confusion or create duplication."

Seminar Speaker

Bryce, president of Tekfax, Inc. of Cincinnati, Ohio, was a cospeaker at a seminar entitled: "Standardization – What, Why, and How?" at the DPMA 1970 International Data Processing Conference and Business Exposition last June in Seattle.

Speaking with him was Robert W. Bemer of GE. It was during Bryce's segment of the seminar that he made the proposal to DPMA to institute a review board to "establish the framework for issuance of all standards and all of the administrative details associated with them."

"The customary manner," Elliott stated, "in which to propose a worthwhile industry program is to document the idea; support it with available material substantiating the need, the practicality of the proposed solution, and the appropriateness of the project to the organization being asked to undertake it; and then to present it to that organization's policy-making body.

"It is not to appear before a seminar audience – as an invited speaker, to issue ill-defined 'challenges' and then carry the campaign into the columns of the trade press," he added.

When queried by CW, Bryce said he was at a loss to understand Elliott's reaction. "After all," he said, "it was DPMA who asked us to give the seminar, who assigned us the subject.

"Listen to how DPMA described the seminar in its conference booklet: 'As the applications of data processing expand in scope, the need for standards becomes increasingly important. This seminar will examine what should be standardized, why it is important that it be standardized, and how the standards effort should be conducted.'

"I don't see how DPMA can be surprised by my proposal," he added. "It was an incorporated part of my paper, which I submitted to DPMA prior to giving the seminar with Bemer."

A spokesman for DPMA had said earlier that DPMA was unaware of the proposal, and Elliott said that he hadn't heard of it prior to the CW article.

CW has learned that the San Francisco chapter of DPMA has now started a standards review committee as a result of the Bryce-Bemer seminar under the direction of Miss Trudy Grieb of San Francisco who was at the seminar.

Six Study Halls?

KNOXVILLE, Tenn. – School officials are optimistic that computer scheduling of student classes will improve as familiarity with the system increases.

Among the emerging idiosyncracies occurring at the start of the school year were the facts that one senior high school student drew six study halls; the band could not practice together until Thursday; and students were taking auto mechanics in the morning and again in the afternoon.

COMPUTERWORLD

book reviews

Operating Systems: Whats And Whys by Ten Authors

By Ned Chapin
Special to Computerworld

Executive Programs and Operating Systems, edited by G. Cuttle and P.B. Robinson, American Elsevier Publishing Co., Inc., New York, 1970, 116 pages, $5.75.

Here is how George does it! Using the George series (1, 2, and 3) of operating systems for the ICL-1900 as the focus, nine of the 10 chapter-authors in the book explain:

- Why operating systems are needed.
- What functions they perform.
- In functional terms, how they do it.

The tenth author talks about real-time requirements for operating systems and uses the Univac Stars for his examples.

One of the other nine authors also describes briefly the European IBM System/4 operating system.

All of the authors work in Britain, and all but one for ICL.

Since no comparable American book exists yet, this book fills a clear need for easily understood and useful information about operating systems. With this book in hand and understood, such U.S. published books as Jamison (Ed.) *Comparative Operating Systems* Brandon/Systems Press, 1969, and the ACM's *Proceedings of the Gatlinburg Symposium* become much more meaningful.

Those books of symposium proceedings lack the integrated view that this book possesses. But this book concentrates on the terminology used by only one vendor – one that is not even a minor factor in the American market.

Ned Chapin is a data processing consultant in Menlo Park, Calif.

Doctor Gives Course In Computing and Numerical Methods

By Yudell L. Luke
Special to Computerworld

A First Course in Computing and Numerical Methods, by John A. Jacques, Addison-Wesley Publishing Co., Reading, Mass., 1970, 365 pages, $11.50.

A striking feature of current scientific activity is that often one's interest at a given time bears little or no relation (in the traditional sense at least) to one's academic training. It is surprising and refreshing to find that the author of this volume is an M.D.

The title macroscopically depicts the work. Emphasis is on computing with numerical methods as a vehicle to use the automatic computer. This easily read volume is an introduction to the subject and is based on notes employed in a two semester course for students of limited mathematical background, the prerequisite being a year and a half of calculus and an introduction to differential equations. Other background is developed in the text as needed.

In illustration, much of the needed portions of linear algebra is developed in the context of linear equations and their numerical solutions, and the subject of linear programming, Chapters 8-13.

An admirable feature of the volume is the inclusion of problems from the biological and life sciences. The exercises in Chapter 15 are particularly interesting as they relate to the development of mathematical models for biological systems.

Yudell L. Luke is principal adviser for Mathematics, Midwest Research Institute, Kansas City, Mo.

PL/1 Is Stressed for the Programmer

By W.S. Hoffman
Special to Computerworld

PL/1 for Scientific Programmers by C.T. Fike, Prentice-Hall, Englewood Cliffs, N.J., 1970, 241 pages, $7.50.

This book presents an excellent introduction to PL/1 for scientific programmers. The emphasis is on programmers since the author assumes the reader is familiar with programming concepts including input/output, arrays, and program structure. The book is logically structured, proceeding from arithmetic operations to loop control to advanced concepts such as interrupt handling and writing of subprograms.

Information Scattered

Unfortunately, as was probably inevitable with a language of the size and scope of PL/1, some information has been scattered throughout the book. Items such as attributes which can be declared for variables, files, and such, should have been summarized at the end. Readers will have to use their reference manuals for this purpose.

Program Suggestions

Unique and highly useful features of the book are the specific suggestions the author provides for use in writing programs. For example, the author's suggestions on precision rules and avoidance of conversions are excellent. Comparisons of PL/1 and Fortran provide a useful frame of reference for appreciating the increased power of PL/1.

Additional space should have been devoted to input/output. Simple record I/O, much more efficient than stream I/O, is quite attractive, even to scientific programmers.

The author includes a chapter on Formac, a programming language for algebraic and analytic operations. While interesting, the space devoted to its discussion could have been more profitably used for an introduction to the PL/1 Macro language which would be of more direct application to readers of this book. *PL/1 for Scientific Programmers* is a significant improvement over earlier efforts both in content, form, style, and contains fewer errors.

W.S. Hoffman is with the Information Systems Division of DuPont de Nemours Inc.

Seminar to Discuss Data Transportation

WASHINGTON, D.C. – "Computerization of Transportation Data and Information Systems" will be the theme for the second national seminar sponsored by the Transportation Data Coordinating Committee (TDCC) at the Statler Hilton, Oct. 13.

Position Announcements

The seminar will stress the need for the transportation industry and the computer industry "to work together to break through the information barrier in transportation/distribution.

The program includes speakers such as John C. Howard, vice-president, traffic, Bethlehem Steel, who will present the "Shippers' Views of Transportation Data Concepts," and Calvin D. Pease, vice-president, marketing, Bank of America, discussing "Banking Services in Future Transport Data Systems."

Societies

The seminar is a public interest meeting in which all companies, organizations, government departments and agencies may participate. Registration details can be obtained from the TDCC at 1101 17th St. N.W., Washington, D.C. 20036.

Bema to Hold Conference Oct. 27-29 in New York

NEW YORK – Two provocative speakers will be featured at the Business Equipment Manufacturers Association (Bema) conference at the Americana Hotel Oct. 27-29.

Presented by the American Management Association (AMA), the conference will, as in past years, run concurrently with the Bema Business Equipment Week Exposition at the Coliseum, Oct. 26-30.

Societies

Economic Insight

Robert S. Weinberg and Martin R. Gainsbrugh are expected to provide considerable insight into the economic climate.

Vice-president of corporate planning at Anheuser-Busch Inc., Weinberg is a member of the company's management committee. He is a frequent contributor to the literature of economic forecasting and analysis, management planning and control, long-range planning, opinions research, management sciences, and national defense economics. He was formerly with IBM.

Weinberg's topic will be "Has Top Management Failed the Computer?"

Speaking at the conference's annual management luncheon, Gainsbrugh will discuss "The National Economy and the Consumer of the Seventies." He is a senior vice-president and chief economist to the National Industrial Conference Board.

Calendar

Oct. 5-8, Toronto – Canadian Business Equipment Manufacturers Association DP Conference. Contact: CBEMA, Canadian Presentation, Ltd., 74 Victoria St., Toronto 210, Canada.

Oct. 5-9, London – Computer '70- International Computer Exhibition. Contact: ASIS, 1140 Connecticut Ave., N.W., Suite 804, Washington, D.C. 20036.

Oct. 11-15, Philadelphia – 33rd Annual National Meeting of the American Society for Information Science (Asis). Contact: Asis, 1140 Connecticut Ave., N.W. Suite 804, Washington, D.C. 20036.

Oct. 12-13, Buffalo, N.Y. – IEEE, ACM Annual Microprogramming Workshop. Contact: W.Y. Stevens, IBM, Box 390, Poughkeepsie, N.Y. 12602.

Oct. 12-17, Tokyo – U.S. Department of Commerce Computer and Peripherals Exhibit. Contact: U.S. Department of Commerce, BIC-936, Washington, D.C. 20230.

Oct. 14-16, Nassau, Bahamas – The Association of Data Processing Organizations, Inc. 30th Management Conference and 9th Annual Meeting. Contact: Adapso, 551 Fifth Ave., N.Y. 100177.

Oct. 15-16, New York – 8th Annual Atlantic Systems Conference sponsored by the Atlantic Division Council (ASM). Contact: Atlantic Systems Conference, P.O. Box 461, Pleasantville, N.Y. 10470.

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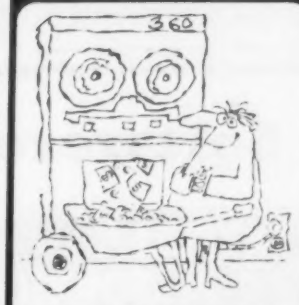

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September 30, 1970

P1000 Data Communication System

Philips Introduces 2 Minis, Data Communication System in Europe

PARIS – Philips Data Systems has introduced two new minicomputers and a new data communication system for the European market.

The firm is presently "undecided" on plans to market the P850 and P880 minis or the P1000 system in the U.S.

The computers cover the full range of the mini market, with the P850 selling for around $3,000 in a rack-mounted version and the P880 offering a 0.64 μsec cycle time at a basic price of approximately $25,000.

Philips, an international company headquartered in The Netherlands, claims that the 880 is "the fastest small computer at present on the market" in its price range and says that the 850 is the "cheapest" machine available with its features.

The P850 features a 1.6 μsec cycle time and 1K to 4K 8-bit words core storage in modules of 1K. Basic word length is 16 bits and the machine features 15 general registers that can be used as accumulators or as store address registers.

The P850 can accommodate up to 32 peripherals via a programmed channel. The unit has 16 bus input and 16 bus output lines and six bus address lines and three bus function lines for input/output.

The P850 is designed as a general-purpose computer for use in data communications as a control unit for a data terminal or as a buffer to concentrate messages; in traffic control and in industry for numerical control of machine tools and automating such things as pipeline pumping stations and short production processes.

Designed and developed in the company's Small Computers Industry Group plant near Paris, the P850 uses TTL integrated circuits partly realized in MSI.

Deliveries of the new computer are scheduled to be made in the second quarter of next year.

The firm's P880, which is aimed more at the end-user market than the P850, has core storage ranging from 8K to 64K words. Each word is 16 bits plus 2 parity bits.

In addition to the store cycle time of 0.64 μsec, the firm said the unit features add time of 1.28 μsec; multiply time of 7.68 μsec; and divide time of 8.88 μsec.

The system boasts an instruction set containing short and long format store reference instructions for word, character and bit handling.

There are 19 registers and a standard 16 interrupt lines, which means the P880 can be used in process control as well as in the scientific and industrial market.

Built-in features are multiply and divide functions; options available are floating-point arithmetic, simplex and multiplex channels and storage protection. The P880 can use Algol or Fortran compilers as well as use a report and update program generator (RUG).

Deliveries of the new system are scheduled to be made in the first quarter of next year.

The new data communications system is designed around the firm's P1000 computer systems – four general-purpose machines, the largest of which has core capacity of 2 to 14 million 8-bit words.

The system is designed for both in-plant and out-plant communication. The equipment developed for the system is connected to the central machine via a character allocated transfer channel (Catch).

Control Unit

This is done by a data communication control unit, a multiplexing device for up to 15 communication lines and these lines are in turn controlled by line control units.

Two types of line control unit are available, one with a maximum operating speed of 200 baud and the other with a maximum speed of 9600 baud. This latter line control unit is capable of continuously scanning the status of the terminals.

It can also, in conjunction with the systems software, write in (selection procedure) and read from (polling procedure) the buffer of an addressed terminal; it also cooperates with Catch to retransmit messages in the event of transmission errors being made.

Up to 32 terminals in a one-address system can be associated with this unit and in a two-address system up to 256 terminals can be used, the firm claims.

Informatics Says Government Favors IBM, July Award 'Restricts Competition'

BETHESDA, Md. – Informatics Inc. last week claimed that the Federal Government is showing "favoritism" toward IBM.

The charge, made in an interview with CW, was the immediate result of an unsuccessful Informatics' attempt to protest a $73,000 contract award to IBM in July by the Department of the Army.

The award, said Werner L. Frank, senior vice-president of the software house, "restricted competition in the industry."

The contract award that ignited Informatics' protest to the General Accounting Office (GAO) – the government agency that watches the U.S. purse strings – was for analysis and design of The Army Operations Center System (Tarmocs II). Informatics had the Tarmocs I award and worked with Univac on the hardware end of it, according to Frank.

Although Frank admitted that Informatics' bid on Tarmocs II was "somewhat higher" than IBM's, he objected that IBM could design a system in which only its equipment would be used because of the limited hardware ban feature in the contract. He added that the lowest bidder does not always win; in 1969, IBM, he claimed, won a different award with a bid $300,000 higher than the one submitted by Informatics.

One-Month Ban

The hardware ban, according to Frank, is only for one month. Informatics, in its protest to GAO, asked that this time period be extended to "a meaningful length" such as a year or two. The way the contract was written, said Informatics, IBM was given a competitive advantage.

The company further protested implications for the Worldwide Military Command and Control System (Wimmix) equipment purchase which has since been held up by the Department of Defense.

Informatics said that the specific exclusion of Wimmix from this hardware ban could result in IBM being given that award too in order to ensure compatibility between it and Tarmocs II.

Within a month GAO ruled against Informatics' complaint; however, it suggested to the Army that it reconsider the one-month hardware exclusion clause. The Army, according to Frank, has "chosen to ignore the GAO suggestion."

However, Richard J. Richardson, the contracting officer, said, when informed of Frank's charge, that "the contract is in compliance with the direction of the Comptroller General of the U.S."

The contract extended the hardware ban from April 30, 1971 to May 31, 1971 and provided "that in the event the contract is not completed on schedule . . . the hardware ban shall be extended from 31 May 1971 by the number of calendar days that the contract completion date is extended. . . ."

Recounting Informatics' alleged problems with IBM in the past, Frank said: "We have been involved in certain marketing situations with the military where IBM was the adversary and where we have been directed to do things which, if we did not comply, we were led to believe we would never be able to do business with that organization.

"Another example is that we would call on a customer and we would develop requirements with him in the hope of being able to submit a proposal. Suddenly, after spending weeks and months with him in developing this, he would tell us, 'Well, we're really not interested. IBM is going to supply us free.'" This happened with both military and commercial organizations, according to Frank.

The Informatics executive further charged that "IBM has literally put us out of the command and control business. One could almost wonder if there may not be some sort of conspiracy with the government to maintain IBM's position."

IBM would not comment on Frank's remarks.

DP Products Score High In 100 Contest Held by IR

CHICAGO – More than 10 computer-related products were among the 100 winners in a new product competition sponsored by Industrial Research Inc.

The computer-related awards are as follows:

- Monsanto Electronic Products & Controls Division, Cupertino, Calif. – "MAN 3" monolithic, seven-segment alphanumeric display.
- Ampex Corp., Research & Advanced Technology Division, Redwood City, Calif. – "TBM" terabit memory.
- Computer Signal Processors Inc., Burlington, Mass. – Model CSP-30 "CompuSignal" processor.
- Digilab Inc., Cambridge, Mass. – Model FTS-14 infrared Fourier transform spectrometer.
- Digital Equipment Corp., Maynard, Mass. – "PDP-11/20" computer.
- EG&G Inc., Data Products Group, Salem, Mass. – Model 832 "Data Interface".
- Wang Laboratories Inc., Tewksbury, Mass. – "3300 Basic" minicomputer time-sharing system.
- IBM Corp., General Systems Division, Rochester, Minn. – "System/3" data processing system.
- Princeton Electronic Products Inc., North Brunswick, N.J. – Model 1M-1200-HS "Lithocon" electrical silicon storage tube.
- Gould Inc., Graphics Division, Cleveland, Ohio – Model 4800 high-speed electrostatic printer/plotter.
- General Electric Co., Space Division, Philadelphia – "Gescan" information retrieval machine.

Senate Approves One-Bank Bill; House Reconciliation Seen Difficult

WASHINGTON, D.C. – The Senate's version of the controversial one-bank holding company bill sailed through that body with only a few minor amendments and was passed by a final vote of 77 to 1 recently.

The Senate bill, which is being bitterly contested by much of the EDP industry – particularly service bureaus – is weighted heavily in favor of the banking industry. The House version, which passed some time ago, is a tougher bill which would, among other things, just about push bankers out of the EDP services business completely.

Two major amendments were introduced during last week's session. One would have stricken the socalled "conglomerate" provision which exempts some 60 conglomerate one-bank holding companies, as well as nearly 900 smaller bank holding companies, from any regulation whatsoever. This amendment was defeated on a close 37-34 vote.

Chicago Show

Machine Tools Seen for I/O

By Thomas Morton
CW Midwest Bureau

CHICAGO – "The time is not too far away," said James A.D. Geier, president of Cincinnati Milacron, "when machine tools, no matter how big they are or how big the product they tool, will be regarded as an output, or an input, device of the computer."

Geier was speaking at the announcement of Milacron's NC Program Editor, introduced at the Machine Tool Show in Chicago last week.

The NC Program Editor, Milacron officials stated, is self-contained and portable, and plugs directly into the NC control at the machine. To make a change, the company explained, the program to be modified is entered into the Editor through a tape reader.

Through an interface between the Editor and the control unit of the machine, the information is transmitted into the NC control of the machine tool. As the tool is operating, the program is displayed on a CRT on the Editor.

Where corrections are to be made, they are entered into the program via the Editor's keyboard. Once the program has been corrected and optimized, a new paper tape is punched automatically.

The paper tape is then used in the NC machine tool in the conventional manner and the Editor used elsewhere. The heart of the new Editor, Geier said, is a Cincinnati CIP minicomputer which coordinates the unit's functions through all of its programs.

Milacron also introduced a scanner at the show.

The Acramatic general-purpose scanner, the company said, allows the machine tool operator to generate an NC tape at his machine using a finished part, or a model of the part, as a master.

GE displayed its CommanDir system dramatically by installing the computer at the Navy Pier and having it run 10 machines on the floor of the amphitheater across town.

The CommanDir system is a small central processing unit with a large drum storage capable of operating up to 15 machine tools simultaneously, GE executives said.

The GE-PAC 30 processor is provided with a TermiNet telecommunication printer and the drum memory. Machining information is supplied to each machine tool on NC by a data distributor attached to the computer.

An auxiliary scanner provides the interface between the computer and the machine tool operator. The major subsystems are the processor and core memory subsystem, TermiNet and paper tape, NC interface and communications operator's station, and the software system.

100-Ton Machine

While the show housed huge machines capable of stamping out the frame of an automobile from a sheet of steel, with one weighing more than 100 tons and standing two and one half stories high, not all of the machines demonstrated were moved into the exhibit areas.

One not moved was a complex machine used to fabricate marine propellers. The machine was on display in Cicero, Ill.

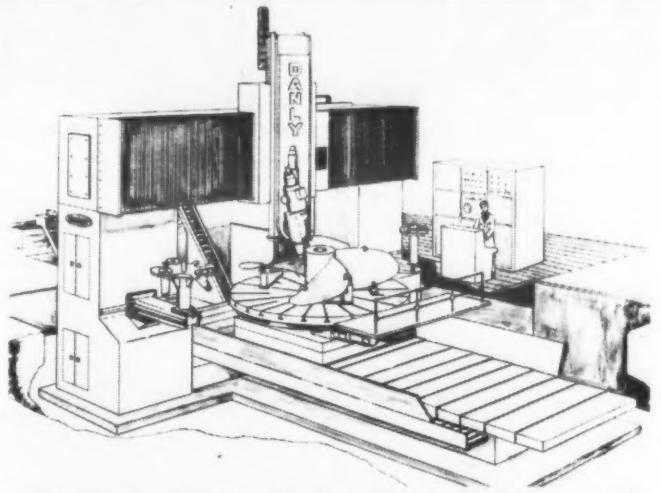
Made by the Onrud Machine Works, a subsidiary of the Danly Machine Corp., the machine can mill, drill, tap, bore, and inspect on five axes to an accuracy of one thousandth of an inch on a 16-ft long propeller. The machine could, the company said, mill and finish a marine propeller from a solid block of bronze with the same accuracy, due to the computerized controls.

James Danly, president of Danly Machine Corp., explained that more than 50 peopie, marine engineers and data processing analysts, worked on the programming.

An IBM 360/65 operates the NC on the machine and the language used is Apt.

Danly said that the nature of marine propellers presented some problems for NC machining. Blade pressures and suction surfaces, he said, are normally expressed by tabulated design rather than mathematical definitions.

Since the machine scans (inspects), the program can be altered to compensate for milling inefficiencies due to cutting tool wear, Danly concluded.



This milling machine capable of working on five axes is operated by a 360/65 using an APT program and DNC controls.

170 Companies Exhibiting

CW Midwest Bureau

CHICAGO – Forty million dollars of machine tools from 170 companies filled 18 acres of floor space in two locations here, the International Amphitheater and Navy Pier, as the Machine Tool Show and its companion, the Production Engineering Show, opened last week.

Hotel and airline officials are indicating an attendance of over 120,000, with more than 10,000 here from overseas.

Major interest apparently focused on computer control of machine tools, called DNC (direct numerical control) in the industry.

This public viewing of DNC was vividly demonstrated to the machine tool industry since 50 of the heavy machine tools on the floor were operated remotely by computer systems.

The highlight of this exhibition of computer technology and the machine tool industry was the operation of 10 different machine tools in the Amphitheater by a computer complex in Navy Pier, some six miles away.

Industry leaders are saying that computers make possible rapid shifts in the types of products being produced, thus increasing precision, efficiency, lowering costs, and reducing inventories.

DNC is the American technological answer to the cheaper labor of foreign competition, industry sources at the show noted.

Test to Use Washington Streets to Improve Traffic

WASHINGTON, D.C. – The streets of the nation's capital are the laboratory in a computerized experiment to improve traffic flow.

The Urban Traffic Control System (UTCS) will be tested at about 130 intersections in downtown Washington, under a $3.8 million contract awarded to Sperry Rand by the Department of Transportation (DOT).

The contract includes installing the necessary hardware, an XDS Sigma 5, and the programming. In addition, Sperry Rand will supervise the operation of the program for one year.

The program is expected to be fully operational within three years, but the research will continue for "some time" after that, DOT said. After the 130 intersections are fully operational, the experiment will be expanded to 200 intersections.

Two kinds of sensors will be buried in the pavement at each intersection, one responsive to all traffic, the other attuned to DC Transit Co. buses.

The sensors feed the central computer by leased telephone cables, and the computer responds with "green" cycles for the intersection's traffic signal, expeditiously moving traffic in that area.

The special bus sensors will result in preferential treatment for the DC Transit vehicles, when the computer determines it is feasible to do so.

Washington was selected as the site of the laboratory test because of its heavy downtown traffic congestion, and because of the attention that will be focused on it in the nation's capital.

Project officials stress, however, that this is not a program designed for Washington, D.C., but rather as an experiment which, if successful, will be available to all cities desiring it. The objective is to develop a workable system to control traffic signals by digital computer.

DOT officials are optimistic that the laboratory experiment will lead to the most advanced traffic control system in the world.

Secretary of Transportation John A. Volpe said: "This test represents one more effort by the Department of Transportation to permit people to move more efficiently, to decrease accidents, and to prevent the strangulation of central business districts. We feel that UTCS has great potential, and we are going to be doing everything to make it function to its maximum effectiveness."

'Biggest Bird in Town' Likes IBM Site

CW Midwest Bureau

CHICAGO – People here, pedestrians and drivers alike, got to know the inner workings of the construction of the new IBM building on Wabash Avenue when they got showered with a milky white goo as they passed the construction site.

The "goo" turned out to be liquid insulation being blown into the walls of the new building. It spattered autos, speckled shoulders, foreheads, glasses, and hairdos.

According to a construction supervisor, a canvas shield had been blown loose by unexpected high winds and the insulation was caught in the same wind. It would, the construction man said, brush right off after it dried.

A Chicago policeman, sent to the site to reroute pedestrian traffic, his blue uniform and cap spattered in white, described the under-construction building as "the biggest pigeon in town."

Inventor Sees Shortcut to Tracking Inventory With Monitoring System

WASHINGTON, D.C. – If you have a few warehouses full of cloth and want to keep track of your inventory without any clerical work at all, Luther G. Simjian has a patent you might be interested in.

Simjian's system monitors bulk dispensers of several types and automatically updates computer inventory files. When a stock clerk has an order to fill he inserts a check card describing the material into a reader. Then, as the dispenser fills the order – of cloth, sand, gravel, liquids, or other bulk commodities – the lot number and volume of the order are signalled to a central computer.

President of General Research, Inc., in Greenwich, Conn., Simjian said he believed his system could eliminate human clerical errors.

Potter Amplifier Reads, Writes 1,600 Bit/in. Tape

PLAINVIEW, N.Y. – A read/write amplifier designed to be used in the electronics components of magnetic tape drives is capable of reading and/or writing 1,600 bit/in. phase-encoded tapes, according to Potter Instrument Company, Inc.

Designated the MA 751, the amplifier can produce tapes that are compatible with those recorded on IBM 2400 Series Tape Units and can provide data transfer rates up to 320K byte/sec, according to Potter.

Two Assemblies

The amplifier consists of two assemblies, the common electronics and up to eight local read/write amplifiers, each mounted in a tape unit.

The write data electronics includes all required circuitry, Potter said, to record the controller generated identification burst, preamble, postamble, and tape mark.

Conversion

Input data is clocked serial-by-bit, parallel-by-character, binary. All data is converted to phase-encoded format prior to recording on magnetic tape.

The read data electronics includes, according to Potter, all required circuitry to strip the preamble, postamble, to detect the tape mark and to provide read deskew and single track error correction. The read output consists of 9 bits of data in a binary format with read clock signal.

Additional features include an automatic head degauss cycle to reduce erasure and pulse distortion, and a shaped write current to optimize data recording symmetry.

Test Points

The MA 751 has test points at the front of the chassis which, Potter said, permit most adjustments to be made with the modules in normal position. Extension frames are included to provide complete exposure of all plug-in modules for circuit testing under operating conditions.

The price of the local electronics units vary from $1,500 to $2,000, Potter said. The common electronics unit is priced at $6,000 to $7,000. The units are currently in production and available on a 12- to 16-week delivery schedule.

Potter Instrument Co., Inc. is on Bethpage Road.

New OEM Products

MB Announces Actuator

NEW HAVEN, Conn. – Two disk memory actuators are being offered by MB Electronics, a Textron Co. located here.

The two units – the B40 and the B60 – do not need magnetic shielding or special power supplies, according to the firm. The units feature less than 2 gauss stray magnetic field, better than 200 μsec response, and a "fail-safe" driver coil.

MB Electronics will custom design actuators and will modify standard units to OEM requirements.

Inter-Computer A/D Modules Bow

LANDSDALE, Pa. – A family of analog-to-digital encoder modules with up to 8-bit resolution and 1 mHz word conversion speed are now available from Inter-Computer Electronics, Inc.

The IAD-M family uses a modification of the successive approximation encoding techniques and includes three models.

The IAD-1308M encodes analog signals to 8-bit accuracy with a throughput time of less than 1 μsec. Binary encoding occurs at 1 mHz internally and up to 1 mHz in the external mode. The Model IAD-1306M has 6-bit resolution and 2.5 mHz maximum word conversion speed. The IAD-2204M has 4-bit resolution and 4 mHz conversion speed.

Unit prices range from $525 to $855 in quantities of 1 to 9. Delivery is three weeks.

Inter-Computer is at 1213 Walnut St.

Data Technology Modules Offered

PALO ALTO, Calif. – Data Technology Corp. has expanded its line of logic modules to include a 70 mHz MECL-to-DTL/TTL converter.

The Model 650 contains eight 2-input level conversion circuits and is compatible with emmitter coupled logic levels at the input and DTL/TTL logic levels at the output. Typical rise and fall times are 8 and 19 nsec respectively.

The Model 650 is contained on a single 3.16 in. by 4.5 in. card with a standard 22 position, 44 contact gold-plated edge connector. Circuits are packaged in 14-pin dual-in-line packages. The price is $99 and delivery is four to six weeks.

The firm is at 1050 E. Meadow Circle.

Phoenix Announces Multiplexer

PHOENIX – A new analog signal multiplexer for industrial applications – available as a standard unit, or with a hermetic option – has been announced by Phoenix Data, Inc.

Model 160570 is designed to provide time-division multiplexing of analog voltage signals. It includes Mosfet switching, no offset voltage, low leakage, low crosstalk, and break-before-make switching.

Price of the Model 160570 in one to five quantities is $290. Delivery can be made within 30 days.

The firm is at 3384 W. Osborn Road.

Nortronics Erase Head Is Compact

MINNEAPOLIS – A two-gap erase head from Nortronics features compact construction.

The Rex-100 series of all-ferrite heads is designed with a die-cast metal frame 11/32 in. wide.

A metal face and case are responsible for superior tape contact surface and heat transfer characteristics, Nortronics said.

Electrical specifications for the Rex-100 erase heads include: 1.0 Millihenry inductance at 1,000 Hz, 7Ω resistance 50 V RMS at 60 Hz, 150 mA erase current and 1.06 erase track.

Power required is less than 1/2W. The heads can also be used with DC erase current, the company said.

Operating at these parameters, the head is said to provide 60 db erasure of saturated 400KHz recording. Tests bearing this out were conducted using 3M 351 tape, Nortronics said.

The Rex-100 heads are priced at $30 each in unit quantities. This decreases with volume to $9 each on an order of 100 heads. The units are currently available for shipment from stock.

The Nortronics Company, Inc. is at 8101 Tenth Ave., North.

Tel-Tech Has Data Sets

ROCKVILLE, Md. – A slow-speed asynchronous data set for private line systems has been developed by Tel-Tech Corp.

Designated the Tel-Tech 103E, the data set's primary application is for usage by common carriers; the Bell-compatible TT103E is designed to be directly connected to the telephone circuit.

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News Analysis

Independent Peripherals, Terminals Lone Bright Spots

By Michael Merritt
CW Staff Writer

While the recesssion in the computer industry may have passed through its severest days, there is still no boom in sight.

A CW straw poll of DP managers of many of the top 100 industrial users, many of whom are just now finishing their 1971 budgets, indicates that another dull year lies ahead for the industry.

The managers reported an average 10% increase in budgets, far behind the pace of earlier years. In particular, mainframes seem hard hit; managers confronted with tight-fisted treasurers seem content to wait for the 370 late in 1971 or in 1972. Hardware budgets in general are remaining flat, and there are few plans for major system upgrades.

Some Successes

There were two bright spots in the picture, though – independent peripherals (IP) and terminals.

Well over half of the managers said that they either had installed or were planning to install tape or disk units made by independent manufacturers.

In the words of one respondent, "Five disks on IBM equal eight on Memorex." Other than outright refusal to get new equipment, the most popular tactic to hold budgets down has been just this move to independents' products.

IPs offer cheaper prices, and they have the advantage of plug-to-plug compatibility, managers said. The manager can order new tapes and disks and begin using them with no new programming or DP room revamping. No fuss or bother, just savings.

There was still a strong minority who didn't want to mix systems, however. Some were in the fortunate position of unconcern about budget problems – "We're after performance, not lower cost" – while others didn't want to bother – "There's not that much difference considering some of the problems we'd have."

The users who had IPs generally said they were satisfied with the units, and some were downright ecstatic. The most frequently mentioned were Telex tape drives and Memorex disks.

It seems that a recession is just what the IP makers need to break into big-time markets, and once in they should be very hard to dislodge – providing they can come up with a substitute for the 3330. Apparently, there is still a large portion of the market resisting IP, though, so salesmen won't have to worry about lack of challenges.

Terminals Sparkle

Input equipment also seems to be selling well, though the picture is murkier here. There are two pressures helping. First, the need for cost reduction, and second, the trend to centralization and time-sharing. The two aren't unrelated because in a time-sharing system the DP manager can allocate costs more directly to users' budgets and reduce his own overhead costs.

However, while a few suppliers dominate the IP market, there is a wide variety of both terminal makers and terminal types. To lower data input costs a DP manager can choose from key-to-tape, key-to-disk, CRT terminals, OCR, and so on.

Almost 75% of the managers reported that they were planning to install terminals of one sort or another in the coming year. This doesn't mean a precipitate phase-out of keypunches, however, since many of the orders are for a small number of units to be used to explore the possibilities of terminals.

The exception to this is time-sharing, of course, where CRT terminals dominate.

Pity the Poor Mainframe

Despite encouraging reports of sales from IBM and the "dwarfs," the largest industrial users – who account for 20% of the non-government computers in use in the U.S. – are holding back on mainframe expansion.

This is primarily an IBM market, and for the short run, at least, the announcement of the 370 has hurt IBM. The managers can justify a one-to-two year hiatus until the delivery of the 370s in which they can hold their mainframe costs constant, a pleasing prospect to the company treasurer.

While the response to the 370 was quite favorable – all had looked at it and a large number ordered for delivery in 1971 or

Finance

1972 – there was practically no interest in upgrading the 360s. Thus IBM may well have a significant lag in domestic revenue growth until it begins shipping the 370.

Ingenuity

The more hard-pressed DP managers are showing greater resourcefulness in bringing their mainframe costs down. For the first time there was significant interest in alternate financing plans, including purchase-lease-back and chattel mortgages. Some of the managers were also curious about the life-expectancy of the 360 and wondering what the 370 will do to the price of used 360s.

Top 100 Have Clout

Though less than 1% of the users in the country, the DP managers for the 100 top industrial companies control about 20% of the non-government equipment in use. CW's straw poll was based on a random selection from this group, covering a wide range of industries, locations, and sizes within the top 100.

Last January a similar CW poll revealed the current budget crunch and predicted the demise of the industry's traditional 15% growth rate.

REI to Sell 54% Interest in Docutel, Considers Giving Up Optimation Centers

DALLAS – Recognition Equipment Inc. (REI) moved on two separate fronts last week in order to relieve mounting financial pressures.

In the first move, the optical character recognition (OCR) equipment manufacturer's subsidiary, Corporation S, offered to give up its interest in several Optimation Centers around the U.S. to the seven banks and bank-holding companies that have been its partners in the jointly owned OCR service centers.

On the second front, REI announced that it had reached an agreement in principle for the sale of a 54% interest in Docutel Corp., a 59% subsidiary of REI. The buyer in the projected deal will be Information Processing Corp. (IPC).

Four bank holding companies already have accepted the offers for the centers, according to Corporation S. The offers are under consideration by other joint-venture partners, the firm added.

Acceptance of the offers by these four joint-venture partners results in Corporation S receiving from approximately $160,000 to over $400,000 in cash from each partner and the potential issuance of 240,000 shares of Corporation S common stock at $5 per share within the next two years, since several of these purchasers will receive warrants, Corporation S said.

The REI-IPC agreement calls for the sale of 628,260 shares of Docutel common stock and cancellation of warrants held by REI to purchase an additional 89,178 shares. REI, however, will retain warrants to purchase 89,179 shares of Docutel common stock. There are 1,154,814 shares of Docutel stock outstanding.

In the last full fiscal year, Docutel lost around $785,000 and REI earned $3.7 million or 74 cents per share.

NCS Shows 1970 Sales Increase; Outlook for 1971 Seen Favorable

NEW YORK – Good improvement in sales and earnings over the next six months was predicted by Fred Nerenberg, chief executive officer of National Computer Services Corp., at the company's annual meeting recently.

"While our first half still showed a narrow deficit, our second half is expected to be profitable with our last quarter of fiscal 1971 showing substantial profits," Nerenberg said.

While fiscal 1970 sales increased by more than 70% over the preceding year and gross profit on operations more than doubled, the company showed a loss for fiscal 1970.

This was due in part to the filing for bankruptcy by two client companies. In addition, deferred income from NCS Franchising Corp. was not taken into consideration under the company's accounting procedures.

These two circumstances amounted to a total sum of $100,000, Nerenberg explained.

COMPUTERWORLD

emerging enterprises

Orom to Produce Verification Devices

SAN JOSE, Calif. – Orom, Inc. has been organized to design and produce an inexpensive, standalone self-contained credit card verification device for use by retail outlets.

The company expects to have a feasibility credit check machine ready this month and begin prototype production in early 1971. According to a company spokesman, the device employs a proprietary, highly reliable electro-optical read only memory which will provide retailers with ability to make a near instant check of a customer's credit status.

The machine's memory unit is the approximate size and shape of a long-playing record and is flexible and mailable. Information is originally recorded by a gas laser and is read optically.

Orom will make a master memory unit by laser, then duplicate the master in quantity using a photographic process. The duplicated optical read-only-memory units will be supplied to Orom users for insertion in the machine.

Other New Companies

A new technical management consulting company, Formation, Inc., in Cherry Hill, N.J., will emphasize evaluation, planning and design services to suppliers and users of information processing systems.

Carterfone Purchases Interest Of DAC in Dacom Subsidiary

DALLAS – Carterfone Communications Corp. has purchased all of the interest of Data Automation Co., Inc. (DAC) in its subsidiary, Data Automation Communications Corp. (Dacom), an equipment leasing and servicing company.

Carterfone now owns all of the Class A common stock of Dacom. The former one-half interest in Dacom owned by Rockwood & Co. has been converted into Class B common stock which Carterfone has the option to acquire for increasing amounts ranging from $1,100,000 within one year to $1,850,000 within five years. Exercise of Carterfone's option is conditional upon the prior payment by Dacom of its pre-existing $1.5 million subordinated five-year debenture held by Rockwood & Co.

DAC received 700,000 shares of Carterfone's common stock with the majority being placed in voting trust with Carterfone director, Manfred New, for a five-year period. The shares may be released from the trust to the extent necessary to maintain DAC's pre-existing 22% voting position in Carterfone.

The shares may also be released upon transfer for DAC shareholders or to unaffiliated persons pursuant to applicable securities laws.

Carterfone also announced that a number of actions have been taken to improve Dacom's overall financial condition.

These include substantial reductions of Dacom's inventory and debt that has been concluded (immediately prior to Carterfone's acquisition) in transactions with Dacom's pre-existing shareholders.

Carterfone will make an immediate capital contribution to Dacom of approximately $400,000 by cancellation of debt instruments acquired from DAC and it is committed to invest another $250,000 on a subordinated debt basis.

Prior to the transaction, Carterfone had slightly over 400,000 shares of common stock outstanding plus options and debentures convertible into approximately 390,000 additional shares.

If Carterfone exercises its right to acquire the remaining interest in Dacom so as to make it a wholly owned subsidiary, it has agreed to issue three-year warrants to the Dacom Class B shareholders allowing the purchase of 700,000 additional shares of Carterfone stock at $2 per share.

Computer Learning Shows Record Earnings, Revenues

CHEVY CHASE, Md. – Computer Learning and Systems Corp. has reported an all-time high in earnings and revenues for the six-month period ending June 30, 1970.

Net earnings were $71,783 compared to a loss of $360,562 for the same period in 1969. Per share earnings were 5 cents for the period. Gross income increased more than 150% to $1,872,125 from the 1969 figure of $726,085.

Both the education division and the applied systems division, representing the corporation's two major areas of business activity, were profitable during the six-month period, the firm said.

Revenues from the education division represented about 72% of total revenues, or $1,358,467. This compared to $578,646 during the first half of 1969.

TRADE*QUOTES

Computerworld Stock Trading Summary

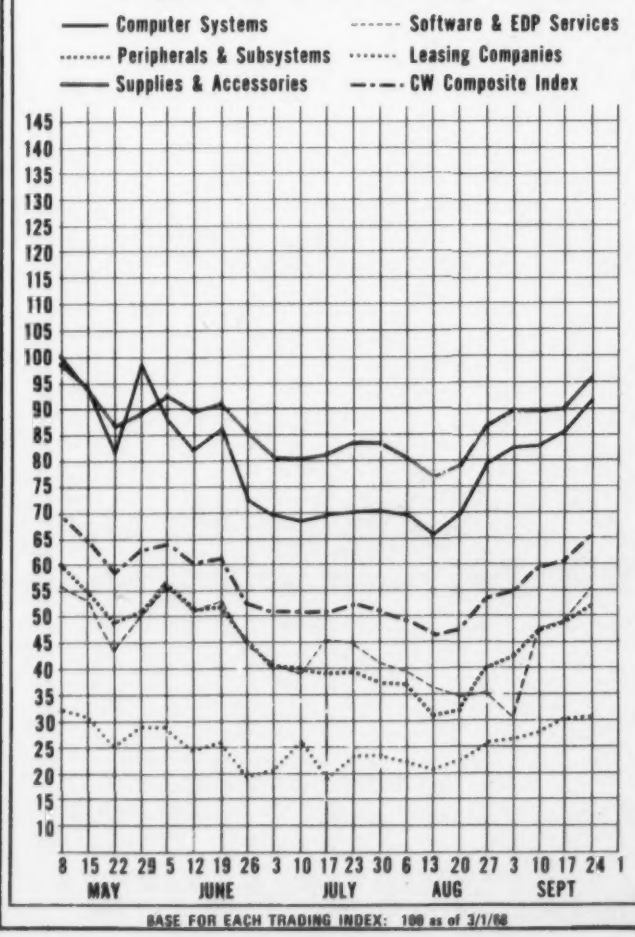
All statistics compiled, computed and formatted by TRADE*QUOTES Division of National Information Services, Inc. Cambridge, Mass. 02139

CLOSING PRICES THURSDAY, SEPTEMBER 24, 1970

EXCH		1970 RANGE (1)	CLOSE SEP 24 1970	WEEK NET CHNGE	WEEK PCT CHNGE
	SOFTWARE & EDP SERVICES				
O	ADVANCED COMP TECH	1- 6	3 1/4	0	0.0
A	APPLIED DATA RES.	4- 24	6 3/4	+ 7/8	+14.8
O	APPLIED LOGIC	2- 19	2 7/8	+ 3/8	+15.0
O	ARIES	1- 8	1 5/8	+ 3/8	+30.0
A	AUTOMATIC DATA PROC	23- 47	39 1/8	+ 3/8	+0.9
O	AUTO SCIENCES	3- 14	5 1/4	+ 3/4	+16.6
O	BRANDON APPLIED SYS	1- 9	1 1/2	0	0.0
O	COMPUTER AGE INDUS.	1- 3	1 1/4	- 5/8	-33.3
A	COMPUTER APPL	2- 12	2 1/2	+ 1/4	+11.1
O	COMPUTER ENVIRON	3- 14	2 1/2	- 1/4	-9.0
O	COMPUTER INDUS.	2- 10	5	0	0.0
O	COMPUTER NETWORK	3- 14	5 1/2	+ 1/2	+10.0
O	COMPUTER PROPERTY	5- 15	6 3/4	+ 1/2	+8.0
N	COMPUTER SCIENCES	6- 34	14 5/8	+1	+7.3
O	COMPUTER USAGE	2- 8	4 1/2	+ 1/2	+12.5
A	COMPUTING & SOFTWARE	16- 75	34 3/8	+6 3/4	+24.4
O	COMRESS	2- 10	3 1/2	+ 1/2	+16.6
O	COMSHARE	3- 15	3 1/2	0	0.0
O	CONSOL. ANAL. CENT.	1- 3	1 3/8	+ 1/4	+22.2
O	DATA AUTOMATION	1- 24	2 3/8	- 1/8	-5.0
O	DATA PACKAGING	5- 29	7 1/4	- 1/4	-3.3
O	DATAMATION SERVICE	1- 6	1 1/4	- 1/8	-9.0
O	DATATAB	5- 9	4 3/4	0	0.0
O	DIGITEK	2- 5	1 5/8	- 1/8	-7.1
O	EDP RESOURCES	5- 13	5 3/4	+ 1/4	+4.5
A	ELECT COMP PROG	3- 11	4 3/4	+ 1/2	+11.7
O	ELECTRONIC DATA SYS.	31-161	62	+7 1/2	+13.7
O	INFORMATICS	4- 21	6 3/4	+ 3/4	+12.5
A	ITEL	6- 26	13 7/8	+ 3/4	+5.7
O	LEVIN-TOWNSEND SERV.	1- 13	4 1/4	- 1/4	-5.5
A	MANAGEMENT DATA	8- 25	15 3/8	+4 1/8	+36.6
O	NAT COMP ANALYSTS	1- 8	3 3/8	+ 1/4	+8.0
O	NAT.COMP. SERV.	3- 12	4 3/4	0	0.0
N	PLANNING RESEARCH	13- 54	25 1/8	+2 3/4	+12.2
O	PROGRAMMING METHODS	9- 27	13 1/2	+ 1/2	+3.8
O	PROGRAMMING & SYS	2- 5	2 1/2	0	0.0
O	PROGRAMMING SCIENCES	2- 33	3 3/8	+1	+42.1
N	SCIENTIFIC RESOURCES	2- 22	4	+ 7/8	+28.0
O	SOFTWARE SYSTEMS	1- 2	5/8	+ 1/8	+25.0
O	TBS COMPUTER CENTERS	5- 27	5 1/2	- 1/2	-8.3
O	UNITED DATA CENTER	2- 4	2 5/8	- 1/8	-4.5
N	UNIVERSITY COMPUTING	14- 99	31	+4 7/8	+18.6
A	URS SYSTEMS	5- 21	7 5/8	+ 7/8	+12.9
O	U.S. TIME SHARING	3- 14	5 1/2	0	0.0
	PERIPHERALS & SUBSYSTEMS				
N	ADDRESSOGRAPH-MULT	21- 62	35	- 3/4	-2.0
O	ALPHANUMERIC	2- 15	5 1/8	+2 1/8	+70.8
N	AMPEX CORP	13- 48	19 1/4	+ 1/2	+2.6
A	ASTRODATA	4- 34	7 3/8	+ 7/8	+13.4
O	BOLT,BERANEK & NEW	3- 11	7 5/8	+ 1/8	+1.6
N	BUNKER-RAMO	6- 14	10 1/8	+1 1/2	+17.3
A	CALCOMP	11- 33	22 7/8	+4 1/2	+24.4
O	COGNITRONICS	3- 13	4 1/2	+ 1/8	+2.8
O	COLORADO INSTRUMENTS	4- 13	8 1/8	+ 5/8	+8.3
O	COMPUTER COMMUN.	5- 36	8 3/4	0	0.0
A	COMPUTER EQUIPMENT	4- 12	5	+ 1/8	+2.5
A	COMPUTEST	14- 28	18	+1 1/4	+7.4
A	DATA PRODUCTS CORP	5- 26	10 1/4	+ 3/4	+7.8
O	DATA TECHNOLOGY	4- 23	4 3/4	+ 1/4	+5.5
O	DIGITRONICS	4- 13	4 7/8	+ 1/8	+2.6
N	ELECTRONIC M & M	7- 40	13 5/8	+1 7/8	+15.9
O	FABRI-TEK	3- 8	4 1/4	- 1/8	-2.8
O	FARRINGTON MFG	2- 17	4	- 1/4	-5.8
O	INFORMATION DISPLAYS	4- 20	6 1/4	+1 1/2	+31.5
A	MARSHALL INDUSTRIES	14- 67	29 7/8	+4 5/8	+18.3
A	MILGO ELECTRONICS	15- 42	33 1/8	+5 3/8	+19.3
N	MOHAWK DATA SCI	19- 87	39 1/4	+5 5/8	+16.7
O	OPTICAL SCANNING	11- 52	18 1/2	-1	-5.1
O	PHOTON	4- 17	9 3/4	+ 5/8	+6.8
O	PHOTO-MAGNETIC SYS.	1- 4	1 1/2	+ 1/4	+20.0
A	POTTER INSTRUMENT	15- 42	25 7/8	+ 3/4	+2.9
O	PRECISION INST.	6- 25	9	+ 1/2	+5.8
O	RECOGNITION EQUIP	13- 83	18 1/8	- 7/8	-4.6
O	REDCOR CORP.	4- 34	6 1/4	- 1/2	-7.4
N	SANDERS ASSOCIATES	7- 29	13 1/4	+1 1/8	+9.2
O	SCAN DATA	6- 53	6 7/8	-1 1/8	-14.0
O	TALLY CORP.	10- 23	15	+1	+7.1
N	TELEX	10- 25	20 1/2	+2 3/4	+15.4
O	VIATRON	2- 51	7 1/8	+ 3/4	+11.7
	SUPPLIES & ACCESSORIES				
N	ADAMS-MILLIS CORP	8- 15	14 1/4	+1 1/2	+11.7
O	BALTIMORE BUS FORMS	10- 21	10	- 1/4	-2.4
A	BARRY WRIGHT	6- 25	11 3/8	+1 7/8	+19.7
A	DATA DOCUMENTS	15- 35	20	+1	+5.2
N	ENNIS BUS. FORMS	11- 19	11 3/4	+ 1/8	+1.0
O	GRAHAM MAGNETICS	5- 7	5 3/4	- 1/4	-4.1
O	GRAPHIC CONTROLS	7- 17	8	+ 7/8	+12.2
N	MEMOREX	46-166	99 1/2	+14 1/4	+16.7
N	3M COMPANY	71-114	90	+4	+4.6
O	MOORE BUS. FORMS	27- 38	31	- 1/4	-0.7
N	NASHUA CORP	21- 43	30 5/8	- 3/4	-2.3
O	REYNOLDS & REYNOLD	25- 48	34	+2 3/4	+8.7
O	STANDARD REGISTER	17- 30	19 1/2	+ 3/4	+4.0
N	UARCO	22- 39	27 5/8	+ 3/8	+1.3
A	WABASH MAGNETICS	7- 30	12 1/8	+1 3/8	+12.7
O	WALLACE BUS FORMS	25- 41	36 3/4	+2 1/2	+7.2
	COMPUTER SYSTEMS				
N	BURROUGHS CORP	78-173	119 1/8	+10 1/4	+9.4
N	COLLINS RADIO	9- 37	16 1/2	+2 3/8	+16.8
N	CONTROL DATA CORP	30-122	46	+2 3/4	+6.3
A	DIGITAL EQUIPMENT	50-124	83 3/4	+4 3/4	+6.0
N	ELECTRONIC ASSOC.	3- 11	6 7/8	+1 3/8	+25.0
A	ELECTRONIC ENGINEER.	3- 14	5 5/8	+ 3/4	+15.3
N	FOXBORO	18- 39	24	+ 3/4	+3.2
O	GENERAL AUTOMATION	9- 42	11	- 1/2	-4.3
N	GENERAL ELECTRIC	60- 82	82	+1	+1.2
N	HEWLETT-PACKARD CO	19- 45	25 1/2	+ 1/4	+0.9
N	HONEYWELL INC	65-152	90 3/4	+ 7/8	+0.9
N	IBM	223-387	288 1/2	+12	+4.3
N	NCR	30- 86	39 3/8	+ 7/8	+2.2
N	RCA	18- 34	26 1/4	- 1/4	-0.9
N	RAYTHEON CO	16- 33	23 1/4	+ 5/8	+2.7
O	SCI. CONTROL CORP.	1- 8	2 3/8	- 1/8	-5.0
N	SPERRY RAND	19- 40	25	+1 1/8	+4.7
A	SYSTEMS ENG. LABS	10- 49	19 3/4	+2 5/8	+15.3
N	VARIAN ASSOCIATES	9- 29	15	+ 1/4	+1.6
A	WANG LABS.	18- 51	37 3/4	+ 7/8	+2.3
N	XEROX CORP	66-115	85 1/4	+5 3/8	+6.7
	LEASING COMPANIES				
O	BOOTHE COMPUTER	8- 25	12 1/8	- 5/8	-4.9
O	BRESNAHAN COMP.	3- 9	3 5/8	- 1/2	-12.1
O	COMPUTER EXCHANGE	2- 8	5 1/4	0	0.0
O	COMPUTER LEASING	3- 18	3	0	0.0
N	DATA PROC. F & G	6- 32	14 1/4	+ 1/8	+0.8
O	DATRONIC RENTAL	2- 8	2 3/4	+ 1/4	+10.0
A	DEARBORN COMPUTER	10- 24	20 1/8	+1 5/8	+8.7
O	DIEBOLD COMP. LEAS.	2- 8	4 7/8	+ 1/8	+2.6
A	DPA, INC.	3- 10	5 1/2	0	0.0
A	GRANITE MGT	7- 22	12 1/8	-1 1/4	-9.3
A	GREYHOUND COMPUTER	5- 44	8 5/8	+ 1/8	+1.4
N	LEASCO DATA PROC.	7- 30	13 3/4	+1 1/4	+10.0
O	LECTRO COMP LEAS	2- 9	3 1/8	+ 1/8	+4.1
A	LEVIN-TOWNSEND CMP	3- 19	7	0	0.0
O	LMC DATA, INC.	1- 3	1 3/8	+ 1/8	+10.0
O	MANAGEMENT ASSIST	1- 4	1 3/4	0	0.0
O	NCC INDUSTRIES	3- 8	4 1/2	0	0.0
O	SYSTEMS CAPITAL	1- 8	3 7/8	+ 5/8	+19.2
N	U.S. LEASING	3- 19	15 3/8	+1 1/8	+7.8

EXCH: N=NEW YORK EXCHANGE; A=AMERICAN EXCHANGE
L=NATIONAL EXCHANGE; O=OVER-THE-COUNTER
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

Computer Stocks Trading Index



BASE FOR EACH TRADING INDEX: 100 as of 3/1/68

Earnings Reports

DATATAB INC.
Six Months Ended June 30

	1970	1969
Shr Ernd	$.09	$.06
Revenue	1,901,495	1,615,977
Earnings	48,348	35,861

a-Restated by company.

COMPUTER COMMUNICATIONS
Year Ended June 30

	a1970	b1969
Shr Ernd	$.05	.....
Revenue	8,763,714	$6,832,055
Earnings (Loss)	57,967	(67,576)

a-Results reflect deferral of proceeds and income from a contract with an affiliate to a later period. b-Restated for acquisitions on a pooling-of-interests basis. c-Based on common and common equivalents.

DIGITEK CORP.
Year Ended May 31

aRevenue	$1,310,000	$1,470,000
Spec Chg	b115,000	.....
Loss	547,498	39,554

a-Reflects reductions due to discontinued business. b-Write down of losses on computer.

NATIONAL COMPUTER SERVICES
Year Ended March 31

	1970	1969
Revenue	$578,012	$351,369
Loss	167,415	153,813

COMPUTER APPLICATIONS
Nine Months Ended June 30

	1970	a1969
Revenue	$22,179,000	$23,864,000
Loss	8,911,000	3,147,000
Spec Chg	d5,430,000	.....
Loss	14,341,000	3,147,000

a-Restated by company. d-Consists of gain on sale of EBS Data Processing Inc. common stock; loss on sale of wholly owned subsidiary; write off of deferred Speedata development costs and provision for loss on discontinued operations.

AMPEX CORP.
Three Months Ended Aug. 2

	1970	1969
Shr Ernd	$.05	$.29
Revenue	64,528,000	68,558,000
Earnings	519,000	3,093,000

AUTOMATIC DATA PROCESSING
Year Ended June 30

	1970	b1969
aShr Ernd	$.66	c$.46
Revenue	39,107,029	28,962,702
Earnings	3,365,341	2,274,030

a-Based on average number of shares outstanding, as reported by company. b-Restated to include companies acquired in pooling-of-interests transactions. c-Adjusted to reflect three-for-one stock split effective Nov. 20, 1969.

DEARBORN COMPUTER & MARINE
Three Months Ended July 31

	1970	1969
aShr Ernd	$.62	$.32
bRevenue	9,218,000	6,491,000
Earnings	973,000	552,000
a9 Mo Shr	1.31	1.81
bRevenue	26,237,000	18,693,000
Spec Chg	c3,621,000	.....
Earnings (Loss)	(1,578,000)	2,193,000

a-Based on net income before special charge and on common and common equivalent shares. b-From continuing operations. c-Consists of divesture of pipeline construction business; adjustment of carrying values of Indonesian oil interests, closing of computer education division, and gain on insurance settlement of offshore drilling rig fire damage.

TELEDYNE INC.
Three Months Ended July 31

	1970	1969
aShr Ernd	$.50	$.49
Revenue	302,536,000	341,679,000
Earnings	16,119,000	15,607,000
a9 Mo Shr	1.50	1.41
Revenue	933,997,000	951,385,000
Earnings	48,475,000	43,103,000

a-On a fully diluted basis.

COMMUNICATIONS SATELLITE
Three Months Ended June 30

	1970	1969
Shr Ernd	$.40	$.20
Revenue	16,793,000	11,546,000
Earnings	3,974,000	1,976,000
6 Mo Shr	.73	.35
Revenue	32,228,000	21,768,000
Earnings	7,319,000	3,501,000

INT'L CONTROLS CORP.
Six Months Ended June 30

	a1970	b1969
Shr Ernd	$.53	$.50
cRevenue	46,300,000	53,800,000
eEarnings	2,000,000	1,900,000

a-Preliminary; excludes deferred gains from bonds and sale of assets to All American Industries, Inc. b-Restated. c-From continuing operations. e-Includes tax benefits.

DRIVE IT FOR A MONTH. FREE.

We'd love to tell you about the new DPF-2425 and DPF-2427 tape drives.

But we figure you'd rather see for yourself.

So to introduce them, we've offered to lend one to any serious potential customer who wants to try it. Free. For a full month. To test under the most realistic, demanding conditions there are: on-line in their systems.

The first six companies to take us up on our offer already have their drives. And their tests are underway right now.

We think a month should be enough time for them to make sure the DPF-2425/7 is completely compatible with the IBM 2420, models 5 and 7. Plug to plug.

And it's enough time to check out the 100 to 200 ips speeds, 160 to 320 kc transfer rates and 1600 bpi phase-encoded recording density.

A month should be enough time to test the completely automatic loading operation. Using either IBM tape cartridges or any other standard tape reel from the 10½-incher to the mini.

It should be enough time to evaluate its tape handling characteristics, too. From the air bearings at all turnaround points to the servo control that protects the tape during rewinding. From the one-point contact head to the fail-safe brake system.

It's more than enough time to make sure the DPF-2425/7 will never need more than 60 seconds to rewind a full 2400-foot reel.

But it may take them a full month to notice all the little refinements that make these drives more reliable than all the others. The solid-state, integrated-circuit controls, for example. The new photo-electric tape sensing in the vacuum columns. And even the UL listing.

If, at the end of a month, they aren't convinced that it offers the best price/performance they can get — from any tape drive — we'll pull it out and take it back.

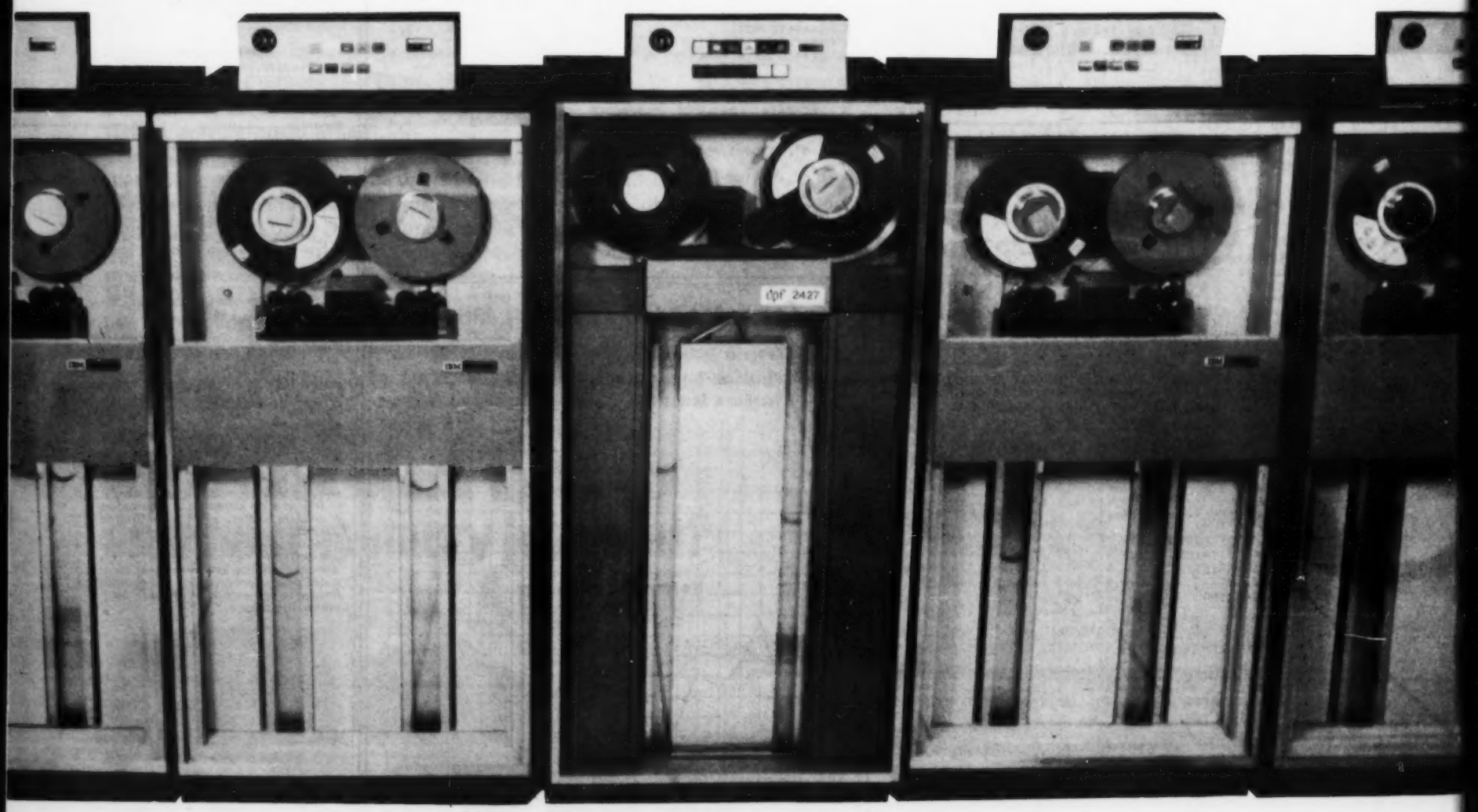
No hard feelings. No problems. No charge.

We think they'll not only want to keep it, but will want more like it. Because we've tried it ourselves. We've tested everything there is to test. And we've not only used it, but we've abused it.

We've even established our own nation-wide maintenance organization to service it.

So we know what the new DPF-2425/7 can do.

And the offer still stands.



Call Don Raby, (914) 428-5000. And while you're talking to him, ask him about the new DPF-2406 tape drive, too. Completely compatible with the IBM 2401 model 6, this new drive has 9-channel phase-encoded recording density, a single-capstan motor, automatic loading and power window as standard features. And SIMS and dual-density as special options.

dpf Data Processing Financial & General Corporation, 141 Central Park Avenue South, Hartsdale, N.Y. 10530